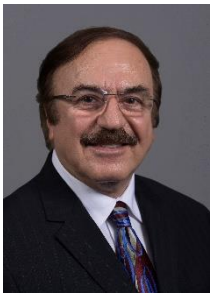
Muthanna H. Al-Dahhan, MSc,.D.Sc., AIChE Fellow



University of Missouri System Curators' Distinguished Professor of Linda and Bipin Doshi Department of Chemical and Biochemical Engineering (ChBE) and of Nuclear Engineering (NE)
College of Engineering and Computing (CEC) Distinguished Professor
Department of Chemical & Biochemical Engineering
Former Chair (January 1, 2009 to June 30, 2019)
Missouri University of Science and Technology (Missouri S&T), Rolla, MO 65409
Mobile: (314) 498-9662 ♦ T: (573) 341-7518 ♦ aldahhanm@mst.edu ♦
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GENERAL

Professor Al-Dahhan's cutting-edge research expertise is concentrated on multiscale experimentation, modeling and computing of multiphase reactors and multiphase flow engineering and applications that integrates hydrodynamics, and heat and mass transfer (transport phenomena) and reactions in addressing and advancing numerous topics, industrial processes, and emerging subjects and technologies related to chemical and petroleum industries, clean and alternative energy and chemicals, bioenergy, thermal hydraulics of the 4th generation, small modular and current nuclear reactors and their nuclear fuels, environmental applications, nanofluids for enhanced heat and mass transfer, and wastewater, groundwater, water and solvent treatment and reuse.

This fully integrated research approach has been enhanced and enabled by developing:

- Advanced and state-of-the-art measurement techniques that are integrated in novel ways into the research and experimental framework and can be utilized in harsh industrial environment and severe conditions to significantly advance the understanding of the engineering science, knowledge, fundamentals, modeling, design, scale-up, scale-down, performance and computational fluid dynamics (CFD) validation of various multiphase reactors, flow and processes.
- Sophisticated experimental set-ups ranging from separate effect and laboratory to pilot plant scale experiments and rigs.
- Several levels of multiscale modeling, neural network and mechanistic correlations, new scale-up methodologies, and CFD validation schemes of various multiphase reactors and multiphase flow systems with implementation of CFD to design the experiments, facilitate the industrial application of new scale-up methodologies, process design and optimization, and to develop hybrid reactor multiscale modeling.

EDUCATION

D.Sc.	1993	Chemical Engineering	Washington U. in St. Louis, MO
MS	1988	Chemical Engineering	Oregon State U., Corvallis, OR
B.Sc.	1979	Chemical Engineering	University of Baghdad, Iraq

(Graduated the first out of 136 graduates in the department and among the top 5 out of more than 1000 graduates in the engineering college consisted of 9 engineering departments, University of Baghdad)

POSITIONS

2019-present	CEC Distinguished Prof.	Missouri S&T, Rolla, MO
2017-present	Curators' Distinguished Prof. of Chemical and Biochemical Engr. (ChBE) and of Nuclear Engr. (NE)	Missouri S&T, Rolla, MO
2009-2019	Dept. Chair, Chemical and Biochemical Engr. (ChBE)	Missouri S&T, Rolla, MO
2009-2016	Professor, (ChBE) and (NE)	Missouri S&T, Rolla, MO
2009-2012	Affiliated Professor	Energy, Environmental and Chemical Engr. (EECE) Dept., Washington Univ. in St. Louis, MO
2008-2011	Affiliated Professor	Laval University, Quebec,

		Canada
2005-2008	Professor	Washington Univ. in St. Louis, MO
2002-2005	Associate Professor	Washington Univ. in St. Louis, MO
1999-2002	Assistant Professor	Washington Univ. in St. Louis, MO
1994-1999	Asst. Prof., Part-Time	Washington Univ. in St. Louis, MO
1994-2008	Associate, Co- Director	Chemical Reaction Engr. Lab. (CREL), Industrial – Academia Consortium, Wash. U., St. Louis
2003-2008	Co-Leader	NSF Engr. Center, Center for Environmentally Beneficial Catalysis (CEBC), Univ. of Kansas, Univ. of Iowa, Wash. U.
1999-2008	Director – PI	Consortium, Gas-to-Liquid Fuels and Chemicals using Slurry Bubble Columns, ConocoPhillips (USA), Eni Technology (Italy), Johnson Matthey Catalyst (UK) (2006-2008), Sasol (South Africa), Statoil (Norway)
2005-2006	UDCT Golden Jubilee Visiting Professor Fellow	University Institute of Chemical Technology (UICT, previously UDCT), University of Mumbai, Mumbai, India
1993-1994	Project Manager	Xytel Corporation, Mt. Prospect Illinois, USA
1991-1993	Instructor	Washington Univ. in St. Louis, MO
1988-1991	Graduate Research and Teaching Assistant	Washington Univ. in St. Louis, MO
1983-1985	Section Head	Pilot Plant for Research, Baghdad, Iraq
1980-1982	Project, Process Engineer	Pilot Plant for R&D, Baghdad, Iraq
1979-1980	Engineer	Training in Italy on Pilot Plant Process Engineering and R&D
1978	Trainee Student	Summer Training in Previous Yugoslavia (now Serbia/Croatia)

SCHOLARLY ACTIVITIES SUMMARY

- **Publications Summary**

  Peer Reviewed Journals Articles: **246**
  Reviewed Proceedings Papers: **78**
  Non-Reviewed Proceedings Papers: **15**
  Total: **339**
  h-Index: **45** (Ref. Scopus, Sep 2021); **54** (Google Scholar, Sep 2021)
  Citations: **7216** (Scopus, Sep 2021); **10539** (Google Scholar, Sep 2021)
  i10-Index: **160**
  Contribution to Chapters: **3**
  Other Non-Reviewed Contribution to Literature: **1**
  I was recognized in 2020 by Stanford University Study as Top 2% of most cited scientists in their respective fields for career long contributions
  https://doi.org/10.1371/journal.pbio.3000918
  https://twitter.com/AAQRL_Biswas/status/1332938647809744896
  https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000918

- **Presentation Summary**

  Invited plenary and keynote lectures: **53**
  Invited talks: **162**
  Conferences Presentations: **500**
  Total: **715**

- **Students**
  PhD Completed as Advisor: **36** (**11** in Academia, **3** in Research Centers and National Labs)
  PhD Completed as Co-advisor: **7** (**1** in Academia, **1** in Research Center)
  International PhD Completed as Co-Advisor: **8** (**3** in Academia) and the Work Done in My Laboratories
  MS Completed as Advisor: **28** (**3** in Academia)
  International MS Completed as Co-Advisor: **7** and the Work Done in My Laboratories
  External Examiner for International PhD and MS Theses: **16**
  Undergraduate Students on research: **108**
  High School Students on research: **12**
- **Co-Workers**
  Postdocs, Research Associates, Visiting/Sabbatical Faculty: **51**

EDITORIAL

2012-present	Editorial Board, Processes, Engineering (2020-present), MDPI Publisher, Basel, Switzerland
2020	Guest Co-Editor Catalysis Today, Elsevier (In Press, 2020)
2019	Guest Co-Editor Fuel, Elsevier (244 (2019) 76-77)
2019	Invited editorial author, J. King Saud U. (JKSU), production and hosted by Elsevier, July, Vol, (31), 3, 2019
2018	Guest Co-Editor Catalysis Today, Elsevier, (305 (2018) 1)
2017-2019	Guest Co-Editor, Processes - Special Issue, 2019, Multiphase Reaction Engineering, Reactors and Processes, Processes, MDPI publisher, Basel, Switzerland
2017	Guest Co-Editor Fuel, Elsevier (198 (2017) 1-2)
2010	Guest Editor, The Canadian Journal of Chemical Engineering, August 2010, Volume 88, Number 4
2006	Co-Editor, Proceedings of Bioenergy I: From Concept to Commercial Processes

- Ex-Member of the editorial board of the International Journal of Chemical Engineering
- Ex-Member of the editorial board of NED University Journal of Research
- Preface of the guest editors:
  - Jorge Ancheyta, Muthanna Al-Dahhan, (2020), Preface: International symposium on advances in hydroprocessing of oil fraction (ISAHOF 2019), Catalysis today, https://doi.org/10.1016/j.cattod.2020.04.001
  - Jorge Ancheyta, Muthanna Al-Dahhan, (2019), Preface: International-Mexican congress on chemical reaction engineering (IMCCRE 2018), Fuel, Vol 224, 76-77
  - Jorge Ancheyta, Muthanna Al-Dahhan, (2018), preface international symposium on advances in hydroprocessing of oil fraction (ISAHOF 2017), Catalysis Today, Vol 305, 1
  - Jorge Ancheyta, Gilbert F Froment, Muthanna Al-Dahhan, (2017), Preface International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2016), Fuel, Vol 198, 1-2
  - M. Al-Dahhan, (2010) Preface: Gas-Liquid Solid (GLS) 9 special issue, The Canadian Journal of Chemical Engineering, Vol 88, 471-472

SELECTED ACHIEVEMENTS AND ACTIVITIES AS A CHAIRMAN OF THE DEPARTMENT
(January 1, 2009-June 30, 2019, Department Chair of the Chemical and Biochemical Engineering)

- ***Acknowledgment of Dr. Mun Choi, President of University of Missouri System in his thanking letter of April 17, 2019:***

"Dear Dr. Al-Dahhan,
Thank you for giving the University of Missouri System a decade of exceptional service. Your work as a Chair of the Chemical and Biochemical Engineering Department has made and important positive impact at the Missouri University of Science and Technology.

Key accomplishments of your tenure have included:

- Construction of Bertelsmeyer Hall, a specialized facility with more than half of its square footage dedicated to research and that houses the Department of Chemical and Biochemical Engineering.
- Hiring 10 new faculty. Before your arrival, the department had no female faculty. Today, 25% of the department's faculty are women. Additionally, the Biochemical emphasis area has been strengthened by their expertise, which is aligned with department interests.
- 73% growth in the number of students in the department, as well as revamping and modernizing the curriculum to better prepare these students for successful futures.
- Increased engagement with many external stakeholders, by discerning industry needs and integrating input and guidance from alumni leadership.
- Maintaining an Exemplary level of personal externally funded research, while serving as chair of a growing and ambitious department.

Your years of tireless dedication to the department are truly appreciated. Thank
You.

Sincerely,
Mun Y. Choi, PhD
President
University of Missouri System**"**

- ***Additional Achievements and Activities with Some Available Data:***

  - ***Sue Simmons*** (member of Board of Trustees of Missouri S&T) in her Zoom chat texted me during our Academy of Chemical Engineers meeting on October 16, 2020 when the gift of $10 Million to our department from ***Bipin Doshi*** (member of our Academy and member of the Board of Trustee of Missouri S&T) mentioned to the Academy members and after I sent thanking text to Linda and Bipin Doshi. Sue Simmons wrote:
    "Hello Dr. Al-Dahhan! All of your good work laid the foundation for the exciting things beginning to happen. I hope you are proud of your accomplishments". This gift established endowed chair for the department chai and two professorships with changing the department name to Linda and Bipin Doshi Chemical and Biochemical Engineering Department
  - I strongly believe in inclusion and diversity. I have practiced and implemented inclusion and diversity throughout my career in academia and industry. During my time as a chair of the department of chemical and biochemical engineering at Missouri S&T from January 2009 to June 2019, I hired 3 women faculty members, and 1 African American faculty member in addition to just 1 Hispanic faculty member when I started in January 2009. The department in 2019 has total 4 women, 1 African American, and 1 Hispanic faculty members besides faculty members with various backgrounds of total 16 faculty members. This was the first time in the history of the department to have such a diversity.
  - Obtained ABET accreditation for the cycle from 2008 to 2014 by overcoming the shortcomings in 2009 and from 2014-2020 without any shortcomings and concerns
  - Actively participated with late Chancellor J. Carney from 2009-2012 in raising over $8 Million from alumni and corporates to build new building for Chemical and Biochemical Engineering Department which currently called **(*Bertelsmeyer Hall*)**
  - Played a key role on the successful design/construction/dedication of the new building (Bertelsmeyer Hall) for chemical and biochemical engineering department, state-of-the-art LEED design (Leadership in Energy and Environmental and Design), state-of-the-art undergraduate laboratories (Fran Conrad Unit Operations Laboratory a Gift from Linda and Bipin Doshi),

advanced research laboratories and teaching facilities with two distance learning classrooms that have brought broader impacts by and on faculty, researchers and students and their achievements

- Established a unique student professional mentoring program with our Industrial Advisory Council (IAC) and Student Advisory Council (SAC) (a student body I established to empower students in helping the students and department). The professional mentoring has been offered to students two-to three times during the semester since 2015 by our alumni from IAC and industry. The program has attracted students from other disciplines. The effort has been published in AIChE *Chemical Engineering Progress,* "Richard A. Bausell, Charles W. Lyon, Muthanna H Al-Dahhan, Improving Soft Skills Through Mentorship*,* Chemical Engineering Progress, December 2020". https://www.aiche.org/resources/publications/cep/2020/december/improving-soft-skills-through-mentorship
- Advancing the effectiveness, involvement of the Industrial Advisory Council (IAC) to support the chair, faculty, students of the department in progressing the department
- Oversaw the program review of the department in May 2018 by a distinguished team (mentioned below) and the development of self-study report that focuses on our department graduate studies and scholarships
- Designating the department chair (Muthanna Al-Dahhan) as one of the strengths of the department in the conclusion and the outcomes of the distinguished Program Review Team in May 2018 that consisted of 3 Members of US National Academy of Engineering (NAE) (Professor Sangtae Kim (chair of the chemical engineering department of Purdue University), Professor Ruben G. Carbonell (Frank Hawkins Kenan Distinguished Professor and Ex-Chair of the department, North Carolina State University) and Dr. Teh Ho (Retired, ExxonMobil Research and Engineering Company, Bridgewater) and 1 Distinguished Professor (Professor Surya Mallapragada, Anson Marston Distinguished Professor in Engineering, Carol Vohs Johnson Chair, Associate Vice President for Research, Ex-Chair of the department, Iowa State University)
- Significantly increased the rate of degrees awarded and students enrollment:
  - BS degrees awarded from 45 in 2008 to 107 in 2016, enrollment from 191 in 2008 to 330 in 2017
  - MS degrees awarded from 3 in 2009 to 15 in 2016, enrollment from 16 in 2008 to 26 in 2017
  - PhD degrees awarded from 0(zero) in 2008 to 6 in 2017, and PhD enrollment increased from 15 in 2008 to 47 in 2017
- Increased research expenditure and number and amount of grants and research contracts awarded from government and industry (from near no funding in FY 2009 to $1,519,250 for FY 2018 up by 500% from FY 2017, and 300% from FY 2016)
- During my tenure as a chairman of the department, the number of African American students in the program and the average earnings of its undergraduates exceeds the national average for chemical engineering programs (Daniel Block, Editor, Washington Monthly in his email on July 6, 2020. He stated "Dear Professor Al-Dahhan, Hello, my name is Daniel, and I'm a journalist at the Washington Monthly. I'm working on a story about college major demographics and future earnings. I'm particularly interested in finding schools where Black students are a disproportionately high share of high-earning majors. And in the course of my research, I came across something quite interesting and cool about Missouri S&T's chemical engineering department. According to IPEDS data, the average earnings of its undergraduates exceeds the national average for chemical engineering programs and the number of black students in the program exceeds the national average for chemical engineering programs."
- Expanded the department expertise and the multidisciplinary research areas and collaborations within the department, university and with national and international institutions
- Successfully retained productive faculty members (e.g., Dr. Xinhua Liang, Dr. Fateme Rezaei)
- Increased the outreach to industry and national laboratories and increased the number of research contracts with industry
- Increased the annual external financial support to the department from alumni, chemical engineering academy and industry through various means
- Established with the chemical engineering academy (elite alumni) one graduate teaching assistant/graders fund per year to support undergraduate laboratory courses and teaching courses

- Increased total number of publications of the department (48 peer reviewed publications in 2017, a 41% increase over the previous year and from 7 publications in 2008)
- Increased number of invited plenary/keynote lectures and invited talks by faculty and enhanced the participations in conferences by faculty and students
- Improving the citation rates and h-indices records of the department through the increasing of the department scholarships.
- Established mentoring program to young faculty members complemented by campus-wide mentoring program
- Promoted faculty and increased awards and recognitions obtained by faculty members (university, national and internationals) (e.g., Faculty Research Award, Faculty Teaching Award, Dean's Scholar)
- Increased awards and recognitions obtained by graduate and undergraduate students (e.g., 4 college of engineering and computing graduate educator awards and 1 college of engineering and computing graduate research award in 2018/2019, undergraduate students' academic excellence, research, etc.)
- Improved number of graduate students publishing in peer-reviewed journals before graduation and established distinguished dissertation award for those who publish 3 papers before graduation and outstanding dissertation award for those who publish 3 papers during the first year after graduation (at least 3 outstanding dissertation award each semester from 2017 till May 2019 Vs. 1 in 2015/2016)
- Increased the number of the faculty members elected to fellowships and leadership in professional societies (e.g., 2 in 2008 to 4 in 2018 as AIChE fellows)
- Enhanced the placement of our graduated students in industry and academia
- Improved record of innovation which is reflected by the increased number of provisional and patents applications and awards
- Increased faculty services to the profession as journal co-editors/associate editors, members of journal editorial boards, chairing/co-chairing national and international conferences, and technical sessions
- Changed the name of the department to chemical and biochemical engineering from chemical and biological engineering to reflect the department curricula and the expertise of the faculty
- Promoting and provided the needed support for outside classrooms activities of the students and student organizations which won awards (e.g., AIChE Outstanding Student Chapter Awards (first time in 2011, 2012, 2013, 2017), Chem-E Car qualifying for AIChE national meetings and won awards, recognition and bronze medal of iGEM)
- Increased diversity and inclusion of the faculty, undergraduate students and undergraduate students
- Changed and modernized the undergraduate, MS and PhD curricula to benefit the students and prepare them well for successful future and for graduate students to enhance their scholarly productivity
- Promoted the alumni for various prestigious awards such as university's (Missouri S&T) Professional Distinction Award (many alumni won the award and for each semester during my time as a chairman of the department), Robert V. Wolf Alumni Service Award, Alumni Merit Award, Alumni of Influence, etc.
- Modernized the undergraduate laboratory and spearheaded the development of new state-of-the-art experiments by obtaining funding from industry (e.g., Emerson and its subsidiaries, ConocoPhillips, Phillips66), alumni and university
- Increased significantly from 2009 to 2019 graduate and undergraduate students on government supports from Iraq, Kuwait, Libya, Saudi Arabia, Malaysia, Brazil, and other countries where the total number increased from none to over 50 in the department and much more for the university
- Established MS degree program via distance to be offered to Kuwait National Petroleum Company
- Worked on the development and establishment of graduate chemical safety certificate
- Enabled the students to contribute to the department and to the process of teaching and learning by establishing and empowering student advisory council

- Facilitated the establishment of two distance learning classrooms in the department – Bertelsmeyer Hall
- Facilitated, promoted, and provided the financial support raised externally for the development of state-of-the-art research laboratories for various areas of research
- Facilitated and secured the funding externally and internally for establishment in the department central analytical laboratory for both undergraduate education and graduate research
- Enhanced the visibility of the department nationally and internationally
- Increased national and international visitors on research as faculty on sabbatical and research scholars and researchers
- Increased and promoted undergraduate students on research during the regular semesters and summer who won many awards and recognitions
- Enhanced the number and type of specialized courses as electives for undergraduate programs and for graduate studies
- Enhanced outreaching to Industry and national laboratories for collaboration and joint projects
- Established strong ties and engagement with alumni, industrial advisory council, and chemical engineering academy
- Promoting joint appointment of the faculty members to increase the level of collaboration and joint projects

SELECTED AWARD AND HONORS

I. Selected Awards

2019 EECE Distinguished Alumnus Award in Recognition of Outstanding Accomplishments, Energy, Environmental and Chemical Engineering (EECE) Department, Washington University in St. Louis. It was given to me in the Washington University reception during the 2019 AIChE Annual Meeting (American Institute of Chemical Engineering) where brochure of invitation sent to chemical engineering departments in USA and from around the world, Hyatt Regency Orlando, Florida, Room Celebration I, November 11

2019-2020 The College of Engineering and Computing (CEC) Distinguished Professor with $40,000 to support research, Missouri University of Science and Technology, August 15, 2019 – December 31, 2020

2017-now Named and Awarded the University of Missouri System Curators' Distinguished Professor of Chemical and Biochemical Engineering and of Nuclear Engineering, University of Missouri System. I was inducted by the Chancellor and Provost and received the medal during December 2016 of Missouri S&T Graduation Commencement in front of graduated students, their families, faculty, university leaderships and administrators, commencement speaker and invitees. I received the Award Plaque from the President of the University of Missouri System in a ceremony of the University of Missouri System, June 2017

2016 A Tier Two 2016 Faculty External Recognition Award, Missouri S&T, May 9

2011 Saudi Society of Chemical Engineers Shield for contribution to chemical engineering in the field of alternative and renewable energy, Saudi Arabia Chemical Engineers Society, Saudi Arabia, Riyadh, May 18

2010 "2010 make a difference in STEM Award". STEM: Science, technology, engineering and mathematics. It was received during the joint celebration of National Engineers week attended by Missouri S&T, the Society of American Military Engineers and Fort Leonard Wood members and Friends

2009 Mesopotamia Award – Washington D.C., for outstanding achievements in Engineering in USA achieved by an academician from Iraq origin, Iraqi Cultural Attaché. The award was administered by the US National Academies – Washington D.C., March 14

2008 CLRI Dr. Y. Nayudamma Distinguished Award for outstanding achievements in Chemical Engineering given by Indian Institute of Chemical Engineers during its annual meeting, ChemCon-2008, and during US-India Symposium on energy and sustainable development, Dec. 27-30

2008 Distinguished Service Award, Students and teachers as research scientists, University of Missouri – St. Louis, in grateful recognition of outstanding support and commitment to the enhancement of science education, July 18

2005 Golden Jubilee Visiting Professor Fellowship, University Institute of Chemical Technology (UICT), Mumbai, India, for the year 2005-2006

2004-2005 Mentor of the year "Big Fish" Award, elected by graduate students, Association of Graduate Engineering Students (AGES), Engineering School and Applied Science, Washington University in St. Louis, MO

2002 STARS award for 5 years of service award – NSF Research Mentor Programs, July, University of Missouri, St. Louis, MO

1995-2008 Certificate of Appreciation from the National Science Foundation-Young Scholars Program of High School Students on Research (1995 to 2008)

1995-1999 Exxon Education Foundation Research Award

1979 Higher Ministry Education Award for the first graduate in the Chemical Engineering Department, College of Engineering, University of Baghdad, Iraq (July 1979) and among the top five out of more than1000 graduated students in College of Engineering

1979 University of Baghdad President Award for the first graduate in the Chemical Engineering Department, College of Engineering, University of Baghdad, Iraq (July 1979) (out of 136 students) and among the top five out of more than 1000 graduated students in College of Engineering

1979 University of Baghdad Academic Excellence Award for the first graduate in the Chemical Engineering Department, College of Engineering, University of Baghdad, Iraq (July 1979)

1979 Society of Engineers Award (Baghdad, Iraq) for the first graduate in the Chemical Engineering Department, (July 1979)

1979 Chemical Society Award (Baghdad, Iraq) for the first graduate in the Chemical Engineering Department, (July 1979)

1978 Award to be trained in Yugoslavia, (Summer 1978)

II. Selected Honors and Recognitions

2021 Cover page of I&EC research, February 17, 2021, Volume 60, Number 6 related to the paper I co-authored, https://pubs.acs.org/pb-assets/images/_journalCovers/iecred/iecred_v060i006-2.jpg?0.06506440195559848, https://pubs.acs.org/doi/10.1021/acs.iecr.0c04313

2020 Recognized by Stanford University Study as Top 2% of most cited scientists in their respective fields for career long contributions

2020 Chosen by IAEA (International Atomic Energy Agency) to train on radioactive tracer technique and its implementation in petroleum industry engineers and scientists from Nuclear Malaysia for two weeks at my laboratory

2019 Honored and Acknowledged by the President Mun Y. Choi of the University of Missouri System in a letter on April 17, 2019 on my decade of exceptional achievements as a department chair of the chemical and biochemical engineering

2019 Honored and Recognized with deep appreciation by the Academy of the Chemical Engineering (ChE) on April 20, 2019 in the annual ChE Academy meeting for outstanding service as the chair of the department of chemical and biochemical engineering (2009-2019)

2019 Selected by Qatar University to review as a team member of two faculty members from USA to review (March 31-Apri 2) the undergraduate chemical engineering program for advancement

2019 Selected for Round Table Discussion in the largest Nuclear Engineering and Science meeting in South America - International Nuclear Atlantic Conference - INAC 2019, Nuclear New Horizons: Fueling our Future - Santos, Sao Paulo State, Brazil, October 21-25

2019 Invited Editorial Author on "Advanced Measurement Techniques for Enabling Multiphase Reactors and Flow Systems for Sustainable and Cleaner Processes", Journal of King Saud University - JKSU - Engineering Sc. Journal, production and hosting by Elsevier, July, Vol, (31), 3, 2019

2019 Selected to review the Professional Engineering Exam for Saudi Arabia Chemical Engineers assigned to King Saud University – Riyadh – Saudi Arabia. The exam targets engineers working in Saudi Arabia who have some years of experience in the field, February 2019

2019 Designated by Mohamed VI Polytechnic University (UM6P) to be a member of a committee to select for hiring new faculty members in chemical engineering for the rank of Assistant, Associate and Full Professor, July 4-5

2018-2019 Selected as a member of the International Program Committee – Delft Process

Technology Institute (DPTI) and its research and education portfolio – Delft Technical University – The Netherlands

2018 Designated the department chair (Muthanna Al-Dahhan) as one of the department strengths in the conclusion and the outcomes of the distinguished Program Review Team in May 2018 that consisted of 3 Members of US National Academy of Engineering (NAE) (Professor Sangtae Kim (chair of the chemical engineering department of Purdue University), Professor Ruben G. Carbonell (Frank Hawkins Kenan Distinguished Professor and Ex-Chair of the department, North Carolina State University) and Dr. Teh Ho (Retired, ExxonMobil Research and Engineering Company, Bridgewater) and 1 Distinguished Professor (Professor Surya Mallapragada, Anson Marston Distinguished Professor in Engineering, Carol Vohs Johnson Chair, Associate Vice President for Research, Ex-Chair of the department, Iowa State University)

2018 Chosen by Pakistan Higher Education Commission for two weeks (August 5 – 18, 2018) to be Distinguished Visiting Professor to Pakistan Institute of Engineering and Applied Science (PIEAS) for lecturing, mentoring faculty members and graduate students on research

2017-now Selected as an advisor and a member of the Supervisory Board of the PhD program funded through the European Marie-Sklodowska-Curie Innovative Training Network on TOMOCON "Smart Tomographic Sensors for Advanced Industrial Process Control" – 12 International institution and 15 Industry – 15 PhD students from institutions from Germany, France, Czech, Poland, The Netherland, Sweden, Finland, and United Kingdom

2017-now Chosen by IAEA (International Atomic Energy Agency) as Chief Scientific Investigator (CSI) representing the developed countries on "Imaging Technologies for Process Investigations and Components Testing" to help developing/under development countries on implementing and utilizing nuclear technology of imaging in applied research, Kick off Meeting, February 11-15, 2019, Vienna, Austria

2017 Chosen by IAEA (International Atomic Energy Agency), Vienna to chair a session and to give invited talks in the International Conference on Applications of Radiation Science and Technology (ICARST, April, 2017)

2017 Selected by US Department of State – CRDF to co-develop and lecture as a consultant on the workshop organized by CRDF on safety and security of chemical and biological laboratories for the universities from Iraqi liberated cities from ISIS (Daesh), (U. of Anbar, Al-Mousel U., Nineveh U., U. of Fallujah, Tikrit U., Samara U.), Baghdad, Iraq, September 24-28

2017 Chosen as a visiting scholar by Institute Mexico de Petroleum (IMP), Mexico, Feb. 13 - 24

2016-2017 Chosen by Total, France to give plenary lecture in October 2016 and 2017, Paris France in Total annual R&D Seminar (MATHIAS 2016 and 2017)

2016 Dow Chemicals adopted my liquid-liquid contactor development for process optimization and with modification for gas treatment which is called Dow Al-Dahhan Cell (2016)

Hsu Chiang, Jeff Ferrio, Xiaoyun Chen, Kishar Kar, Joel Reihl, Michael Church, Dan Friedhoff, Muthanna Al-Dahhan, (2016, June 13), Dow Al-Dahhan cell for measuring intrinsic kinetics of a reaction in two-fluid-phase system, 24th International Symposium on Chemical Reaction Engineering (ISCRE24), Minneapolis Minnesota, U.S.A, June 12-15

2015 Selected as invited speaker and for panel discussion in the workshop on University Chemical Safety and Security Frame Work, "Best Practices for Implementing Chemical Safety and Security in Iraqi Universities", Organized by US Department of State and Pacific Northwest National Lab (PNNL), Istanbul, Turkey, September 13-17

2015 Elected as AIChE Fellow, July, 2015

2014 Inducted to Chemical Engineering Academy, Missouri S&T, October, 2014

2014 Featured as, "Movers & Shakers", The Catalyst Review, vol. 27, Issue 2, February, 2014

2012 Selected to Review and provide feedback for establishing PhD program in Chemical Engineering at King Abdulaziz University – Jeddah – Saudi Arabia, May, 2012

2012 Selected by Rentech (alternative energy company), Colorado, USA to be their consultant to assess the risks and benefits of their scale up design from demonstrating unit to commercial plant, 2012

2011 Selected by UNESCO as a member of a team to review the scientific research in Iraq: situation and perspectives, Beirut, Lebanon, September 27-28, 2011

2011 Inducted to Tau Beta Pi (US honor society for engineers) as a member in April 2011

2010-2019 Selected as consultant to review the 7th, 8th, and 9th Strategic Plans (2010/2011, 2014/2015, 2019) of the Petroleum Research Center of Kuwait Institute for Scientific Research (KISR), Kuwait

2010-2016 Selected as expert/consultant by UN-UNESCO as a member of a team of 5 experts from around the world on Quality Assurance of Engineering Education – We provided workshops, lectures, training session, mentoring, and site visits to 12 Iraqi Universities (U. of Baghdad, Al-Mustansiriyah U., U. of Kufa, U. of Karbala, U. of Babylon, U. of Al-Qadisiyah, Al-Muthanna U., U. of Thi-Qar, U. of Al-Basrah, U. of Misan, U. of Anbar, Al-Mousel U.)

Selected Examples of Activities:

- Workshops in Doha-Qatar, June 2011, in Erbil – Kurdistan Iraq, June 2012 and February 2014, Amman, Jordan, October 2013 (two workshops), and November 2015, Erbil Kurdistan Iraq (May 2016)
- Site visits to 12 Iraqi Universities (2013-2015)
- Reviewing self-study reports

2010-2014 Chosen by US Department of State through CRDF to supervised and host 3 faculty members and 3 engineers as part of the Iraqi Fellow Scientific Program

2010-2011 Selected as consultant to ADM, Decatur, Illinois, USA to help in correcting the performance of their first industrial plant for new process related to processing the Glycerin byproduct of biodiesel production, where my technical recommendations and analysis helped to operate properly the plant, 2010/2011

2010 Selected as a member US delegates to US-India Symposium on development of sustainable energy and Environment sponsored by NSF in December 2010

2009 Selected by The Catalyst Group Resources, Inc. to author two chapters on scale-up of trickle bed reactors and fluidized bed reactors distributed to its industrial sponsors

2009 Selected by UiTM University in Malaysia – Shah Alam, to review their chemical engineering curriculum and program, February, 2009

2008 Our results have been adopted by ABB Lummus Global for redesigning the reactor for new environmentally benign technology for alkylation process on improving octane number of the transportation fuel. The technology is currently for licensing

2008 Selected for US – India Symposium on energy and sustainable development sponsored by NSF to give an invited talk in the symposium, Dec. 27-29, 2008, Punjab University, India

2007-now Selected as expert/consultant for IAEA (International Atomic Energy Agency), Vienna, Austria

Selected Examples of Activities:

- Expert (June 25-29, 2018) consultants meeting, Krakow, Poland, on Cross-Correlations of Radioactive Tracer Technique for Industrial Applications
- Expert (December 23-27, 2018) to help Kuwait Institute for Scientific Research (KISR), Petroleum Research Center in establishing a laboratory to implement nuclear technology on measurements and diagnostics in oil and gas industrial processes for imaging and visualization
- Organized and lectured in a week short course and workshop on Industrial Process Tomography, Regional Training Course on Capacity Building for Industrial Tomography Applications, Nuclear and Energy Research Institute (IPEN-CNEN), São Paulo, Brazil, Oct. 2018. Scientists and Engineers from all South America, Central America and Caribbean countries were attended
- Expert to KISR (Kuwait Institute for Scientific Research) on a mission to help KISR implementing radioisotopes for enhanced petroleum processing and give lectures on these technologies, 2012
- Representative of IAEA (International Atomic Energy agency) to organize and lecture in Asia Scientific short course in Malaysia, August 2010 on industrial gamma ray process tomography. Scientists and Engineers from 12 Asian countries were attended (Bangladesh, China, Korea, India, Indonesia, Malaysia, Mongolia, Myanmar, Pakistan, Philippine, Thailand, Vietnam)

- Expert to South Korea – Daejeon (Korea Atomic Energy Research Institute, KAERI) for one week (July 6 – 10, 2009) to give short course to engineers, scientists, faculty, and graduate students on industrial applications of radioisotopes for imaging and visualization
- Consultant for the consultants meeting called by International Atomic Energy Agency (IAEA) to assist the agency in formulating an international project on visualizing industrial multiphase flow systems using radioisotopes, October, 2008, 2010, Vienna, Austria
- Expert to Malaysian Nuclear Agency (Summer 2008) to train about 30 engineers, scientists, faculty, and graduate students on industrial applications of radioisotopes for imaging and visualization
- Chaired the consultants meeting called by International Atomic Energy Agency (IAEA) to help the agency establishing an international project of radioactive particle tracking techniques, October 22-25, 2007, Vienna, Austria

2007 Chosen as an expert by HOK and Aramco to help in developing the research laboratories of King Abdullah University for Science and Technology – KAUST for graduate studies, Jeddah, Saudi Arabia

2006 Featured as the invited speaker to BTL (Biomass-to-Liquid-Fuels) 2006, Munich, Germany

2004-2008 Our findings and results facilitated the design and operation of the world largest slurry bubble column for converting natural gas to transportation fuels in Qatar; A joint venture between Sasol, South Africa and Qatar

2004 Featured as the invited speaker of the 2004 BIOPHEX Conference & Expo.- Reed Exhibition

2000-2006 Improved the anaerobic digesters engineering and hydrodynamics for treating animal and farm wastes and its conversion into renewable energy (2000-2006), where-in USA 76 digesters prior to 2000 were shutdown out of 100 for animal waste treatments

1995-now Selected to be external examiner to PhD and MS theses and faculty promotion evaluator by universities around the world (e.g., Canada, Mexico, Europe, Asia, Africa, Middle East)

1995-now Selected as a consultant by a large number of Energy and Chemical Industry, research centers and universities in the USA and around the world

1995-now Recognized to receive travel awards to many national and international meetings as an invited speaker and plenary/keynote lecturer

1995-2008 Certificate of Appreciation from the National Science Foundation-Young Scholars Program (supervising high school students in research during summer) (1995 to 2008)

1995-1999 Chosen by Exxon Education Foundation Research for unrestricted Grant (1995/1996, 1996/1997, 1997/1999)

1979 Ranked first out of 136 students graduated in the chemical engineering department, and among the top five of more than 1000 students graduated in nine different departments of the engineering school. Ranked first from first grade through engineering school

Selected Recognitions by Iraqi Universities and Higher Education

2017 Recognition by University of Koya for Co-Chairing and Co-Organizing the International Conference on Environmental Impacts of the Oil and Gas Industries, EIOGI 2017, April 17-19

2013-2014 Selected by the Engineering consultation office of the University of Al-Qadisiyah as consultant to review, provide feedback and approve the design and the process of Al-Daghara municipal wastewater treatment plant designed by Hitachi, Japan, Al-Qadisiyah Province, Al-Diwaniyah, Iraq

2009-now Appreciations for contributions to Higher Education and Scientific Research in Iraq
Selected Examples:
Ministry of Higher Education and Scientific Research (Dec. 2009), Ministry of Science and Technology (June, 2009), U. of Karbala (Dec. 2009), U. of Al-Qadisiyah (June 2009), U. of Kufa (Dec. 2010), Tikrit U. (May 2010), U. of Technology - Baghdad (Dec. 2013, Jan. 2016, May 2019), U. of Al-Qadisiyah (Dec. 2015, 2019)

2009 Invited by the Iraqi Ministry of Science and Technology among few scientists and academicians from around the world to help in developing scientific and engineering research capacities, Baghdad, Iraq, June 22-24, 2009

III. My Students' Awards and Recognitions

2021 Binbin Qi won the department Excellence in Teaching Assistance award, May, 2021.

2019 Jasmine Monr, Steven Gibbons, Zaid Haha, (undergraduate students), Qusay Al-Obaidi (Graduate Student), received the First Place Award on Advanced Removal of Heavy Metal from Industrial Wastewater Using Emulsion Liquid Membrane Enhanced by Ionic Liquid, Engineering Poster session, 15th Annual Missouri S&T undergraduate research conference, April 16

2018 Laith Sabri won the department Distinguished PhD Dissertation Award Dec., 2018

2018 Haider Taofeeq won the department Outstanding PhD Dissertation Award, May, 2018

2018 Abbas Sultan won the department Distinguished Dissertation Award, May, 2018

2018 Humayun Shariff and Vineet Alexander won Deans Graduate Educators, April, 2018

2018 Ibrahim Said won the department Distinguished Dissertation Award, Jan. 26

2017 Laith Sabri won the 3rd place poster presentation in "Young Researcher Award", Engineering and Analysis Division, Algae Biomass Summit, Salt Lake City, Utah, Nov. 1

2017 Vineet Alexander won the 2nd prize for his work on "Performance evaluation of Hydrotreater reactor" in the 3 Minute Thesis (3MT) 2017 competition conducted by the Graduate Studies at Missouri S&T, Rolla, Nov. 30

2017 Dr. Ahmed Youssef (my ex-student) the lead scientist at SABIC – USA won among the 35 winners of the AIChE under 35 year-old members with significant contributions to the chemical engineering profession

2016 Abbas Sultan and Laith Sabri won "Third Place Paper Prize" in the International Symposium on Chemical Reaction Engineering (ISCRE 24), June 12-15, 2016, Minneapolis, MN on the work entitled "Investigation of the influence of heat exchanging tube (internals) size on phase distribution in bubble column for Fischer-Tropsch (FT) synthesis by using computed tomography (CT) technique"

2016 Abbas sultan, Laith Sabri, Ibrahim Said and Thaar Al-Juwayie won travel awards to ISCRE24, Minneapolis, MN, June 12-15, 2016

2016 Francisco das Chagas silva (undergraduate student) won poster campus award in April

2013-2014 Vaibhav Khane was featured by, Advanced Short-Term Research Opportunity (ASTRO) (2013-2014), Oak Ridge Institute for Science and Education (ORAU), Oak Ridge National Lab (ORNL) for his achievement due to the quality of my supervision and training he has been receiving at Missouri S&T

2013-2014 Neven Ali won GAANN Fellowship – US Department of Education – Graduate Assistance in Area of National Need (GAANN)

2013 Rahman Abdulmohsin won GAANN Fellowship – US Department of Education – Graduate Assistance in Area of National Need (GAANN)

2012-2013 Vaibhav Khane won Oak Ridge National Lab internship to work on computing problem during Summer of 2012 and Summer and Fall of 2013

2012 Rahman Abdulmohsin received a travel award to ISCRE 22 in Holland, September

2012 Vaibhav Khane received a travel award to Winter 2012 ANS conference

2011-2016 Neven Ali won Missouri S&T Chancellor Fellowship

2009 Sean Mueller, received Bridging GAPS Award for promoting interschool communication and collaboration at Washington University in St. Louis

2009 Ahmed Youssef received Frist Prize in graduate students' research symposium, engineering category, Washington University in St. Louis, 2009

2009 Mohamed Ezat Awad and Ahmed Youssef won a travel award from World Congress on Chemical Engineering, WCCE08, Montreal, Canada, August, 23-28

2009 Ahmed Youssef and Mohammed Ezat Awad were selected to be sponsored by Bioenergy-II: Fuels and Chemicals from Renewable Resources, March 8-13, 2009, Rio de Janeiro, Brazil

2009 Ahmed Youssef and Mohammed Ezat Awad were selected to be sponsored by Gas-Liquid-Solids Reactors (GLS 9), Montreal, Canada, August, 23-28, 2009

2008 Zachary Levinson (high school student) received the 2008 LMI/D3 Technologies Award for excellence in research for his research on heat transfer in bubble column for energy efficient and clean fuels production, students and teachers as research scientists (STARS), 2008

2007-2008 Mohamed Ezat Awad awarded the Cheryl Walzel-Frick and F. Alan Frick scholar for 2007-2008

2007 Adam Rey (high school student) received in 2007 a "highly superior" rating from St. Louis Division of the Missouri Academy of Science

2007 Ahmed Youssef awarded the August and Ruth Momeyer Scholarship, Washington University in St. Louis, 2007

2006 Ana Beatriz (Bia) Henriques received "Honorable Mention" in the ChE Division Poster Competition at the 2006 ASEE Meeting, Portland, Oregon, "A bioenergy-based bench-scale experiment for undergraduate engineering students", Session 1513

2006 Ana Beatriz (Bia) Henriques won the Engineering Conferences International (ECI) travel award to attend and participate in organizing Bioenergy I: from concept to commercial production, March 5-10, 2006

2005 Todd Frederick Romkema (high school student) won the 2005 Pfizer award for Excellence in Research, The Pfizer & Solutia students and teachers as research scientists (STARS) Program

2005 Mehul Vesvikar won 2005 and 2006 outstanding laboratory teaching assistant, Chemical Engineering Department, Washington University in St. Louis

2005 Sean Mueller won August and Ruth Homeyer Memorial Scholarship, Washington University in St. Louis

2004 Jing Guo won ISCRE 18 travel award to ISCRE-18, Chicago, June 7-9, 2004

2004 Jing Guo won 2004 outstanding laboratory teaching assistant, Chemical Engineering Department, Washington University in St. Louis

2004 Rebecca Hoffman won a prize for her presentation in 9th annual Mid-America Environmental Engineering Conference – 2004. The award was given by the district 8 branch of the American Public works association

2003 Huping Luo, Satish Bhusarapu, Mehul Vesvikar (Washington University) won the Chemical Reaction Engineering (CRE) Division travel award for 2003 AIChE meeting in San Francisco

2002 Rebecca Hoffman won 2nd place award in Poster Students presentation – Environmental Division, 2002 AIChE meeting, Indianapolis, Indiana, November 3-8

2001 Javier Alvare won the travel award for 2001 AIChE meeting in Reno – Chemical Reaction Engineering Division

2000 Robby Prasad (high school student) won the 2000 E. Reuben and Gladys Flora Grant Charitable Trust Award for Excellence in Research, NSF-Solutia students and teachers as research scientists (STARS) Program

2000 Amy Chen (undergraduate student) qualified for honorable mention in the 2000 AIChE Regional Conference held in St. Louis, March 24-26

1999 Yi Jiang won the department best graduate student seminar, 1999

1998 Mathew Muether (high school student) won the 1998 E. Reuben and Gladys Flora Grant Charitable Award for excellence in research, NSF Young Scholar,

1998 Yi Jiang and Jonathan Mettes (undergraduate student) won 2nd place prize – Group 1: Fundamental Science and Engineering, 1998 AIChE annual meeting-Students Poster

SELECTED INNOVATIONS, SIGNIFICANT CONTRIBUTIONS AND IMPACTS

I. Innovative and Significant Technical Contributions and Industrial Impacts

2019/2020 Developed new technology for removing or extracting heavy metals and removing organic pollutants from wastewater and water using combined magnetic nanoparticles and ionic liquid in emerging technology of emulsion liquid membrane. A patent has been filed in 2020.

2018 Improved energy efficiency and productivity of thermal Multi-Stage Flash desalination (MSF) process using nanofluid of magnetic Fe_2O_3 nanoparticles

2017-now Studied for the first time the segregation of the pouring concrete mixture contents using radioactive particle tracking (RPT) technique

2017-now Developed 5x5 rods separate effect experiment to investigate the thermal hydraulic of small modular nuclear reactors (SMRs) and light water nuclear reactors (LWRs) that integrates advanced measurement techniques of bubble dynamics, heat transfer coefficients, cross sectional phases distribution along the height and 3D flow field, velocity and turbulent parameters of the water and vapor (gas) phases

2017-2018 Developed new design for gas-liquid inlet in a gas-pocket type of distributor of two phase upflow packed bed and moving bed reactors to improve reactors flow distribution and performance

2016-2020 Studied the ethylene production by liquid phase acetylene hydrogenation in two-phase flow packed beds and for the first time compared the performance of concurrent up-flow with down flow by developing state-of-the-art high temperature and high pressure packed beds, slurry and baskets reactors facility with all the safety precautions and explosion proof shielding

2016-2019 Developed a new technique that combines 4-point optical fiber probe for bubble dynamics measurement and heat transfer probe flush mounted on the heat exchanging tubes and surfaces to measure heat transfer coefficients simultaneously with bubble dynamics and their time series in gas-liquid and gas-liquid-solid flowing systems and reactors for a wide range of industrial processes

2016-2017 Quantified for the first time in a new way the dispersion of the flowing cooling gas in a scaled down channel of prismatic block nuclear reactor by implementing gas dynamic tracer method on a separate effect experiment of tapered channel to maintain similar gas velocity along the height of hot and cold regular channels measured by hot wire anemometry to avoid implementing the tracer technique in a natural circulation operation

2015-now Our development on investigating the natural convection and heat transfer in our unique newly-developed separate effect experiment provides the key understanding and the validation of the computational fluid dynamics and heat transfer computation of the prismatic block nuclear reactors when accidents occur. This enables safe operation and commercialization of this technology

2015-now Developed new methodology, algorithm and data processing to measure the static liquid holdup and the liquid holdups inside the pores of the porous catalyst in two-phase flow packed bed reactors using gamma-ray densitometry (GRD) or gamma-ray tomography (CT)

2015 Our results and findings of the heat transfer coefficients from pebble to the flowing cooling gas in pebble bed nuclear reactors (4^{th} generation nuclear energy) have been adopted by Oak Ridge National Laboratory's (ORNL) Liquid Salt Test Loop (LSTL) to correct heat transfer coefficient (HTC) for pebble locations by inferring the average HTC for the bed

2014-now Developed with KISR, Chevron and Idemitsu scaled-down counter-current flow of moving catalytic bed for petroleum hydrotreating processes and studied for the first time the performance problems in relation to the flow hydrodynamics

2014-2019 Quantified the natural convection in cold flow scaled-down dual channels representing prismatic block nuclear reactor and investigated for the first time heat transfer coefficients from the inner walls of the hot and cold channels and the diameter profiles of gas velocity and bulk temperature along with the height of the channels. The obtained benchmarking data have been used to modified and validate computational fluid dynamics with heat transfer computation

2014-2016 Developed new integrated techniques and adjuster with 1 mm increment movement that combine in a novel way flush mounted on the inner wall heat transfer coefficient measurement probe, hot wire anemometry for gas velocity measurement and bulk temperature measurement of flowing gas to measure simultaneously for the first time the diameter profile of gas velocity and temperature and heat transfer coefficient from the inner channel wall to the flowing gas along the height of the channel for cold flow prismatic block nuclear reactor

2014-2015 Developed unique separate effect cold flow experiment of its first kind representing scaled-down prismatic block nuclear reactors (4^{th} generation nuclear energy) with the assistant of computational fluid dynamics (CFD) that consists of dual channels and upper and lower plena to study natural convection in case of an accident. The unit was designed with cooling upper plenum, insulated lower plenum, one channel was heated and the other channel was cooled to be able to adjust the intensity of natural circulation of helium and the range of heating and cooling. The unit has provided new and for the first time needed and key knowledge, insight and benchmarking data to advance the safety, modeling and the technology of prismatic block nuclear reactors for commercializing the 4th generation nuclear energy

2014 Al-Dahhan Cell for liquid-liquid mass transfer studies has been selected by Dow Chemicals and jointly modified to be named Dow Al-Dahhan Cell (2016) for gas-liquid processes development

Hsu Chiang, Jeff Ferrio, Xiaoyun Chen, Kishar Kar, Joel Reihl, Michael Church, Dan Friedhoff, Muthanna Al-Dahhan, (2016, June 13), Dow Al-Dahhan cell for measuring intrinsic kinetics of a reaction in two-fluid-phase system, 24th International Symposium on Chemical Reaction Engineering (ISCRE24), Minneapolis Minnesota, U.S.A, June 12-15

2014	Developed new measurement technique based on new signal processing method of two point optical fiber probe that enable for the first time the measurement of local liquid and gas velocities, their saturations, their time series and the time windows of the presence of gas and liquid reactants in two-phase flow packed bed reactors
2014	Our development in measuring the thickness and type of materials deposited in the petroleum production pipes (in-shore and off-shore) using our developed technique of gamma ray densitometry formed the basis for Shell and Tracerco to enter into an agreement to deploy such a technique into the industrial applications as diagnostic and monitoring tool to identify the location and prevent clogging in oil production
2013-2016	Developed a separate effect experiment of a tubular reactor to measure for the first time the dynamics growth rate (dynamic kinetics) model and the related parameters for bioenergy produced microalgae
2013-2014	Developed X-ray particle image velocimetry to measure 2D local liquid velocity in two phase flow packed beds (trickle beds and upflow beds) using nanoparticles
2013	Developed new in-situ calibration technique based on collimated detectors for radioactive particle tracking techniques (RPT and MRPT)
2013	Developed new hybrid radioactive particle tracking (RPT) technique which eliminate the needed separate step of calibration that enables the transformation of the technique to industrial applications as a key diagnostic tool with use of short half-life isotopes for the radioactive tracer particle
2012-now	Our new development on mechanistic scale-up of gas-solid spouted beds for TRISO nuclear fuel particles overcomes one of the key bottlenecks in commercializing the production of the TRISO fuel particles while maintaining the quality of coating for industrial applications of the 4th generation nuclear energy which needs proper and safe coated particles
2012-2019	Advanced the understanding of the mechanistic mechanism of the combined effect of bubble dynamics on heat transfer coefficients from the heat exchanging surfaces and walls to the flowing fluids in bubble columns, slurry bubble columns and fluidized beds for a wide range of industrial processes. A new model of contacting time that outperforms what has been reported in the literature was developed
2012-2019	Played key role on the successful design/construction/dedication of the new building (Bertelsmeyer Hall) for chemical and biochemical engineering department, state-of-the-art LEED design (Leadership in Energy and Environmental and Design), state-of-the-art research and educational laboratories and teaching facilities with two distance learning classrooms that have brought broader impacts by and on faculty, researchers and students and their achievements
2012-2018	Studied for the first time the 3D hydrodynamics of phases' distribution, cells' movement, turbulent parameters, mass transfer, bubble dynamics during the growth and culturing of microalgae in an air-lift and tubular bioreactors. The findings and benchmarking data are essential for validating the developed new modeling approach and computational fluid dynamics (CFD)
2011	Improved the reactor and enabled the proper performance and operation of plant for processing the byproduct (glycerin) from biodiesel production to value chemical for ADM, Decatur, IL
2009-now	Our newly developed sophisticated measurement techniques of non-invasive gamma-ray emitted radioisotopes, optical fiber probes, heat transfer probes and gas/liquid tracer dynamics for flow imaging and visualization and heat transfer quantifications could be deployed in process harsh conditions for process performance monitoring and for unique industrial bench marking data and knowledge that are lacking
2009-now	Advanced the knowledge, understanding and scale-up of TRISO nuclear fuels particles manufacturing using gas-solid spouted bed coaters which represent one of the bottlenecks for commercializing the 4thy generation nuclear energy
2009-now	Developed two single radioactive particle tracking (RPT) techniques that accommodate columns of up to 18-inch and up to 30-inch with their automated calibration devices, reconstruction algorithms and data processing to measure phases 3D flow field, trajectories, velocity components and resultant velocity, turbulent parameters, local and overall residence time distribution, stagnant and bypassing zones. The technique can be applied on all

multiphase reactors and flow systems. The technique is essential for validating computational fluid dynamics (CFD) simulations and selecting the proper closure models

2009-2017 Developed new methodology and reliable and simple calibration devices for two point optical fiber probes for a wide range of solid sizes and densities and harsh conditions to study gas solid systems that can measure simultaneously solid velocity, solid holdup, and their time series, bubble size and velocity and their time series

2009-2013 Developed unique separate effect cold flow experiment of its first kind representing scaled down pebble bed nuclear reactor (4^{th} generation nuclear energy) that control without jamming the rate of a pebble that is exiting the bed and carrying by moving belt to hopper and structure of tubing and swirl to be returned and placed at various locations at the top of the bed in a non-violent manner. The unit was developed to be used with integrated advanced techniques of radioactive particle tracking (RPT), gamma ray tomography (CT), non-invasive heat transfer pebble probe, and gas dynamic tracer. The unit has provided new and for the first time needed and key knowledge, insight and benchmarking data to advance modeling and the technology of pebble bed nuclear reactors of the 4^{th} generation nuclear energy

2009-2013 Developed non-invasive heat transfer pebble probe that for the first time has provided local with orientation of heat transfer coefficients from the surface of the pebble to the flowing cooling gas phase in cold flow scaled down pebble bed nuclear reactors

2009-2013 Measured and modeled for the first time using RPT discrete element method (DEM) the movement and trajectory of the pebbles and residence time distribution (RTD), and the bed structure using CT of the cold flow scaled down pebble bed nuclear reactors

2007-2008 Our new development on new enzymatic bioethanol production process with Eastern Regional Research Center of US Department of Agriculture was implemented successfully for industrial trial of bioethanol production of the plant of Central Ethanol Company, Sauget, IL with the enzymes provided by Genecor. The new process increased the ethanol yield, reduced the emission and energy consumption

2007 Transformed our technique of gamma ray tomography and co-developed industrial tomography scanner (ITS) that was implemented on the industrial pilot plant monolith multiphase reactor of Air Products and Chemicals which formed the basis for Tracerco to commercialize it as industrial tomography scanner (ITS)

2006-2016 Developed and investigated for the first time mini-optical fiber probe that placed by micro-machining inside 1 mm square channels of two phase flow monolithic reactors to measure the flow structure, bubbles and liquid slugs velocities and holdups inside the two phase flow monolith

2005-now Advanced the implementation and development of 4-point optical fiber probes for measuring the local distribution of the bubble size, velocity, specific interfacial area, bubble frequency, local gas holdup of gas-liquid and gas-liquid-solid fluidized flow systems and reactors

2005-now Our new development on integrating hydrodynamics, the dynamic growth of microalgae and light intensity model to quantify and optimize the microalgae culturing and its performance has enabled overcoming the trial and error approaches in culturing microalgae leading in saving time, achieving better design, saving capital and operating cost and enabling the use of algal in bioenergy production, wastewater treatment and high-value products production

2005-now Developed non-invasive gamma-ray densitometry that can be used for research and for online industrial applications to identify flow regime with a new indicator and statistical and chaotic analyses, diameter profiles of phases holdups, mal-distribution, validating computational fluid dynamics (CFD) and enabling the newly developed scale-up methodology. This technique has been applied on multiphase flow systems and reactors and for the first time on sustainable construction materials of mixed concrete with steel fibers, to identify cracking and steel distribution and positions

2005-2019 Developed new methodology and algorithm for dynamic gas and liquid tracer techniques for multiphase reactors and flow systems that allow the deconvolution of the external and analysis lines volumes to extract the dispersion signal of the bed alone

2005-2019 Developed non-invasive heat transfer probes that measure heat transfer coefficients from surfaces of heat exchanging tubes and walls to flowing fluids of gas-liquid, gas-liquid-solid, liquid-solid, liquid-liquid and gas-solid systems and reactors

2005 Developed for the first time the integration of the hydrodynamics and reaction in studying and modeling two phase flow monolithic reactors

2004-2018 Developed a new methodology for scale-up multiphase reactors that their flow dynamics are dictated by the dispersed phase by maintaining the similarity in the diameter or radial profiles of the dispersed phase holdup. The method has been validated using advanced measurement techniques on bubble columns, gas-solid spouted beds and fluidized beds. The development includes enabling the methodology on industrial applications by computational fluid dynamics (CFD) and gamma-ray densitometry (GRD)

2004-2005 Developed a new method to quantified and measured in-situ the solid flux of fluid catalytic cracking (FCC) for petroleum cracking and liquid solid circulation of UOP new environmentally benign alkylation process and for any other circulating fluidized beds by implementing the method of cross correlation of short lived radioactive tracer particle with the collimated detector and gamma ray densitometry

2003-now Developed with Oak Ridge National Laboratory for the first time multiple radioactive particle tracking (MRPT) technique and developed the needed reconstruction algorithm, data processing and calibration methodology that can track up to 8 radioactive particles of various densities and sizes representing various solids and liquids (made composite of same density of the phases) to measure phases 3D flow field, trajectories, velocity components and resultant velocity, turbulent parameters, local and overall residence time distribution, stagnant and bypassing zones. The technique can be applied to all multiphase reactors and flow systems. The technique is essential for validating computational fluid dynamics (CFD) simulations and selecting the proper closure models

2003-now Our findings on the effect of heat exchanging internals in bubble and slurry bubble columns and fluidized beds have formed the basis for validating computational fluid dynamics (CFD) models and codes and heat transfer computations that are needed for proper and safe industrial applications

2003-2008 Co-developed single optical fiber probe and methodology to detect the level of expanded solvent of a mixture of solvent and supercritical CO_2

2003-2007 Developed unique method to quantify the residence time distribution (RTD) in open-open system using the measured trajectory of the tracer radioactive particle movement measured by radioactive particle tracking (RPT) technique. This was applied on slurry bubble column for clean alternative fuels and chemicals, and circulating fluidized beds for fluid catalytic cracking (FCC) of petroleum

2003-2005 Developed for the first time methodology and study to measure the apparent reaction rate of a monolith in a basket two phase reactor that enable quantifying its effectiveness factor in comparison with the true reaction rate of crashed monolith in a slurry three phase reactor

2002-now Developed with Oak Ridge National Laboratory for the first time dual-source gamma-ray computed tomography (DSCT) technique and developed new image reconstruction algorithm of poly-energetic using alternating minimization (AM) algorithm to measure time-averaged cross-sectional distribution of gas, liquid, and solid phases that are dynamically moving along the height to produce 3D images. The unit with one radioactive sealed source (CT) can be used for two-phase flow systems and reactors and for two-phase flow packed beds. The technique is essential for validating computational fluid dynamics (CFD) simulations and selecting the proper closure models

2002 Our results on mixing and hydrodynamics of upflow liquid phase packed bed reactor were used by ABB Lummus to redesign and operate a proper reactor for environmentally benign liquid-solid alkylation process to increase the octane number of the fuel – The process is available for licensing by ABB Lummus

2000-2008 Studied with Oak Ridge National Laboratory for the first time the integrated effects of hydrodynamics, design, configurations and mixing intensity of the anaerobic digesters on the anaerobic digestion and the digesters performance

2000-2007 Our findings and development advanced significantly the anaerobic digester for treating the animal waste and producing bioenergy by overcoming the industrially faced problems that caused he shutdown of 76 digesters out of 100 in USA (as of the status by 2000). We redesigned and rebuilt based on our findings the 15,000 Gallon Iowa Energy Center's digester

2000-2006 Integrated the biochemical reaction and the organisms population tagging with hydrodynamics to understand the impact of hydrodynamics and shears on the performance of the anaerobic digesters

2000 Our results on quantification of two-phase flow in liquid-solid risers were used by UOP to design and operate the reactor for environmentally benign liquid-solid alkylation process to increase the octane number of the fuel – The process is available for licensing by UOP

1999-2008 Our advancements on bubble and slurry bubble column reactors for clean alternative fuels and chemicals from syngas (CO and H_2) obtained from natural gas, coal and biomass have been used in designing and operating the world largest slurry bubble column reactors by Sasol/Qatar in Qatar to convert natural gas to transportation fuel

1995-now Developed state-of-the-art multiphase reactors and multiphase flow research laboratory which becomes one of the unique laboratories in USA and the world that integrate sophisticated measurement techniques, separate effects, laboratory to pilot plant scales experiments, and advanced computational, modeling and scale up/scale down techniques. These techniques that can be implemented in harsh industrial conditions become essential for validating multiphase computational fluid dynamics (CFD) models and enable advancing the understanding, knowledge, fundamentals, modeling, design, scale-up/scale-down and the performance of the multiphase reactors and flow systems (See the section of the research facilities developed)

1995-now Conducted cutting-edge research and studies that produce significant technical contributions on various multiphase reactors and multiphase flow systems that impact wide range of industrial processes using novel integrations of advanced measurement techniques, separate effect, laboratory to pilot plant scale experiments and modeling and computations (See the sections of the list of plenary/keynote lectures, publications, invited talks and conference presentations)

1995-now Developed several levels of multiscale modeling of various multiphase reactors to predict and optimize their performance and design and to integrate catalyst scale modeling level into reactor scale modeling. This has been applied to two-phase flow packed beds, two-phase flow structured packed beds, bubble columns, and slurry bubble columns used for a wide range of industrial processes

1995 Developed a new reproducible method for packing small bench scale packed bed reactors with inert fines for catalyst testing and kinetics study which has been used in industry (Muthanna H. Al-Dahhan, Yuanxin Wu, and Milorad P. Dudukovic, (1995), Reproducible technique for packing laboratory-scale trickle-bed reactors with a mixture of catalyst and fines", Ind. & Eng. Chem. Res., 34, 741-747)

1989-now My work on modeling and analysis of gas-solid monolithic and plate reactors has constituted Chapter 27th in the textbook of the Chemical Reactor OmniBook of Professor Octave Levenspiel, (Chapter 27. Tube Wall, Monolith and Plate Catalytic Reactors), July 2002, ISBN-0-88246-173-7 (see below the hand-written and signature acknowledgment of Professor Levenspiel)

1988 Developed new cell of separate effect experiment for liquid-liquid mass transfer with/without reaction studies that provide the needed known interface stability over a wide range of mixing intensities. Later it was adopted by Dow and modified to gas-liquid systems for process development to be called Dow Al-Dahhan Cell

II. Patents and Applications

Patents:

US 2021/0121825 A1: Enhanced emulsion liquid membranes for extraction of pollutants from water. Invertors: Muthanna Al-Dahhan, Qusay Al-Obaidi, (**2021**)

Applications

2018 Upflow/OCR plenum new design to improve and enhance performance. This is19MST003 (Al-Dahhan, Alexander, and Kamalanathan) (Missouri S&T)

2017 Nanofluid heat transfer toward thermal process desalination. This is case 19MST013 (Al-Dahhan & Zouli) (Missouri S&T)

2017 Optical probe development for the packed bed for local velocity measurements of liquid and gas and local saturation (holdup) of liquid and gas simultaneously with their time series. This is 18MST024 (Al-Dahhan and Alexander) (Missouri S&T)

III. Other Selected Significant Technical Contributions and Acknowledgments

2016 The Chief Editor of IJCRE (H. de Lasa) wrote in his email on July 2, 2016: "I am very pleased to communicate that your manuscript entitled "Bubble Columns with Internals: A Review Volume 11, Issue 1 (Jun 2013), is in between the 20 most downloaded articles in IJCRE in the last 5 years"

2012 Shaikh, Ashfaq, and Al-Dahhan, Muthanna H. (2007), A review on flow regime transition in bubble columns, International Journal of Chemical Reactor Engineering, MS#1368, Vol. 5 – R1, the Berkeley Electronic Press, received 1551 full-text downloads since date of posting (2007-8-19) till (2012-2-9), http://www.bepress.com/ijcre/vol5/R1, No tracking after 2012-2-9

2012 Rhys Griffiths, an acquisitions editor at Elsevier for Chemical and Process Engineering books wrote on August 5, 2012: "Your research has been so highly cited that you have one of the highest h-indices in your subject area. Our understanding of the h-index ranking is that you are not only highly cited, but you are meaningfully prolific, which is to say that you publish important contributions to the scientific literature, at the right time, and in the right journals. Given your influence in the scientific community, we are hopeful that you would consider the possibility of publishing a book with Elsevier"

2008 Successfully guided the development of gamma ray tomography (CT) technique in Nuclear Malaysia which was funded by the International Atomic Energy Agency (IAEA)

2005-2012 Successfully transformed our gamma ray computed tomography (CT) technique to the Nuclear Engineering Department of King Abdul Aziz University (Saudi Arabia), ipen (Brazil), and KAERI, Korea, IFP (France)

1999-2005 Provided critical guidance to the implementation of the multiphase measurement techniques on the DOE pilot plant of slurry bubble column operated by Air Products and Chemicals that enabled successfully the development of the processes of converting syngas (CO and H_2) from coal, natural gas and biomass to clean alternative liquid fuels and chemicals

SELECTED ACTIVITIES AND SERVICES

I. Professional Activities and Services

2019-2020 Led the effort on modifying the biotechnology curricula of College of Biotechnology, University of Al-Qadisiyah (D. Fredous Jabir, Dr. Amer Daham, Dr. Mohamed Al-Askary), Iraq and Missouri S&T (Dr. D. Forciniti, Dr. D. Westenburg), USA, sponsored by US Embassy, Baghdad, Iraq through IREX (International Research and Exchange Board)

2019-2020 Co-Developed hybrid ground water treatment of Al-Qadisiyah Province jointly with Al-Qadisiyah University (Dr. Amer Daham), Iraq, sponsored by US Embassy, Baghdad, Iraq through IREX (International Research and Exchange Board)

2019, 2010-11, & 2014-15 Consultant for strategic planning – Petroleum Research Center, Kuwait Institute for Scientific Research (KISR) – Kuwait, 7th, 8th and 9th Strategic Plans

2019 Reviewer to Qatar University as a member of team of 2 faculty members from USA to review (March 31-Apri 2) its undergraduate chemical engineering program for advancement

2019 Member of the committee designated by Mohamed VI Polytechnic University (UM6P), Morocco to interview and select new faculty members in chemical engineering and chemistry for the rank of Assistant, Associate and Full Professor, July 4-5

2019 Reviewed and provided feedback for establishing the Professional Engineering Exam for Saudi Arabia Chemical Engineers assigned to King Saud University – Riyadh – Saudi Arabia. The exam targets engineers working in Saudi Arabia who have some years of experience in the field, February 2019

2018-2019 Member of the International Programme Committee – Delft Process Technology Institute (DPTI) & its research and education portfolio – Delft Technical University – The Netherlands

2018 Distinguished Visiting Professor for two weeks (August 6 – 17, 2018) sponsored by Pakistan Higher Education Commission to Pakistan Institute of Engineering and Applied Science

(PIEAS) for lecturing, mentoring faculty members and graduate students on research

2017-now Workshops co-founding, participating and lecturing with Sandia National Laboratory, Sandia, NM, USA on Chemical and Biological Security and Safety (CBSS) of laboratories for Iraqi graduate students in USA and around the world (over 500 graduate students were trained before they returned to Iraq) sponsored by US Department of State and US Department of Defense. The 3-days workshops are as follows:

- Atlanta, GA, USA (Oct. 18-20, 2019); Manchester, UK (July 24-26, 2019); Boston, MA, USA (July 18-20, 2019); Kuala Lumpur, Malaysia (Feb. 14-16, 2019); Sydney, Australia (Feb. 8-10, 2019); New Orleans, LA, USA (Dec. 18-20, 2018); Edinburgh, UK (Oct. 12-14, 2018); Jamestown, South Carolina, USA (May 18-20, 2018); Liverpool, UK (March 17-19, 2018); Atlanta, GA, USA (Feb. 23-25, 2018); Kansas City, MO, USA (Dec. 1-3, 2017)

2017-now Advisor and member of the Supervisory Board of the PhD program funded through the European Marie-Sklodowska-Curie Innovative Training Network on TOMOCON "Smart Tomographic Sensors for Advanced Industrial Process Control" – 12 International institution and 15 Industry – 15 PhD students from institutions from Germany, France, Czech, Poland, The Netherland, Sweden, Finland, and United Kingdom

2017 Co-Developed and lectured in (as consultant to US Department of State) a workshop (Iraq, Green Zone) on safety and security of the chemical and biological laboratories in Iraqi Universities (U. of Anbar, Al-Mousel U., Nineveh U., U. of Fallujah, Tikrit U., Samara U.) of liberated cities from ISIS (Daesh) organized by CRDF, Amman Office, Jordon (Sept. 25-29, 2017)

2016-2017 Co-Developed of treatment and disposal of spent molecular sieves (catalysts) in gas and petroleum processing, Iraq, jointly with Koya University (M. Haseeb), Kurdistan, Iraq sponsored by US States Department through IREX (International Research and Exchange Board)

2015-now ABET Program Evaluator (PEV) to Chemical Engineering Program

- 2019 Sultan Qaboos University, Muscat, Oman
- 2017 Texas Tech University (TTU), Lubbock, TX, USA
- 2016 New Mexico Institute of Mining and Technology (NMIMT), Socorro, NM, USA
- 2015 Louisiana State University (LSU), Baton Rouge, LA, USA

ABET Program Evaluator (PEV) to Nuclear Engineering Program

- 2020/2021 King Abdulaziz University, Jeddah, Saudi Arabia
- 2019 South Carolina State University, Orangeburg, SC, USA
- 2018 Virginia Commonwealth University, (VCU), Richmond, VA, USA

2015-now AIChE Fellow and Member of AIChE International Committee

2013-2014 Reviewed, provided feedback, and approved the design and the process of Al-Daghara municipal wastewater treatment plant designed by Hitachi, Japan, Al-Qadisiyah Province, Diwaniyah, Iraq

2012 Reviewed and provided feedback for establishing PhD program in Chemical Engineering at King Abdulaziz University – Jeddah – Saudi Arabia, May 2012

2011-2012 Reviewed the design and operation of the ADM Plant, Decatur, Illinois, USA and helped properly operating and performing the plant for new process related to processing the Glycerin byproduct of biodiesel production

2011 Reviewed (as a member of a selected team sponsored by UNESCO) the scientific research in Iraq: situation and perspectives, Beirut, Lebanon, September 27-28, 2011

2010-2016 Expert/Consultant for UNESCO - UN on Engineering Education Quality Assurance for Iraqi Universities, a member of 5 experts from around the world team. We provided workshops, lectures, training, site visits and reviewing self-study reports to 12 Iraqi Universities sponsored by UNESCO – Amman, Jordan Office - Doha-Qatar, June 2011, Erbil – Kurdistan Iraq, June 2012 and February 2014, Amman, Jordan, October 2013 (two workshops), and November 2015, Erbil Kurdistan Iraq, May 2016 – U. of Baghdad, Al-Mustansiriyah U., U. of Kufa, U. of Wasit, U. of Babylon, U. of Al-Qadisiyah, Al-Muthanna U., U. of Thi-Qar, U. of Basrah, U. of Misan U., U. of Anbar U., Al-Mousel U.

2010-2014 Supervised 3 faculty members and 3 engineers as part of the Iraqi Fellow Scientific Program sponsored by US Department of State through CRDF

2010 Co-offered 3-days workshop on Scientific Research Methodology to the scientists of the Ministry of Science and Technology, Baghdad, Iraq, December 21-23, 2010

2010 Chaired consultants' committee meeting to define international project on measuring industrial multiphase flow systems using radioisotopes for International Atomic Energy Agency (IAEA), October, Vienna, Austria

2009-now Panel member

- NSF reviewing panels, Industrial Innovation and Partnership (SBIR/STTR), Catalytic Processes and Technology, August 30, 2011; Bio-Based Chemicals, January 26, 2012; Catalytic Processes and Technology, USA, February 22, 2012
- NSF reviewing panel on US-Pakistan joint research projects, USA, May 2010
- Panel and round table discussion, "Nuclear New Horizons: Fueling our Future", International Nuclear Atlantic Conference - INAC 2019, - Santos, Sao Paulo State, Brazil, October 21-25, 2019
- Panel and round table discussion, "Nuclear Technology Applied in Industrial Processes and Cultural Heritage Conservation", IX ENAN, Recife, Brazil, November, 28 2013
- Panel and round table discussion, "Scenario of the Nuclear Technology Industrial applications", IX ENAN, Rio de Janeiro, Brazil, September 27 – October 2, 2009
- DOE- NERI (Nuclear Energy Research Initiative) review meeting related to VHTRs (Very High Temperature Reactors), Salt Lake City, Utah, USA, August 11-12, 2009
- "Clean Coal Utilization", Energy Summit, University of Missouri system, Columbia, Missouri, USA, April 22-23, 2009
- "How can we help higher education in Iraq", Iraqi Academics Conference sponsored by US national Academies, Washington DC, US Academies, USA, March 14-15, 2009

2009 Reviewed the chemical engineering curriculum and program of UiTM University in Malaysia – Shah Alam, February 2009

2008 Chaired consultants' committee meeting to define international project on visualizing industrial multiphase flow systems using radioisotopes for International Atomic Energy Agency (IAEA), October, Vienna, Austria

2007-now Expert/consultant for IAEA (International Atomic Energy Agency) provided training, short courses, lectures, helping in development of techniques and laboratories, defining projects for developing countries, defining technical problems to be studied – Krakow, Poland (2018), Kuwait (2018, 2012), Sao Paulo, Brazil – South America, Central America and Caribbean (2018), Kula Lumpur, Malaysia – 12 Asian Countries (2010, 2008), Seoul, South Korea (2009), Vienna, Austria (2007, 2008)

2007 Consultant for development of research laboratory by HOK with Aramco for King Abdullah University of Science and Technology (KAUST), Saudi Arabia

2007 Chaired consultants' committee meeting to define the international project of radioactive particle tracking techniques for International Atomic Energy Agency (IAEA), October 22-25, Vienna, Austria

2006-now Member of the international board of gas-liquid-solids (GLS) reactors engineering, USA

2006-now Founded, Co-Founded and Chaired and Co-Chaired technical conferences

- Co-Chaired the International Symposium on Advances in Hydroprocessing of Oil fractions (ISAHOF), 2017 Mexico City, Mexico, June 4-7, 2017, and Mazatlán, Mexico June 9-12, 2019
- Co-Chaired the International Mexican Congress on Chemical Reaction Engineering (IMCCRE), Querétaro, Mexico, June 5-9, 2016, and Mazatlán, Mexico, June 10-14, 2018
- Co-Chaired the International Conference on Environmental Impacts of the Oil and Gas Industries, (EIOGI 2017), Koya, Kurdistan region, Iraq, April 17-19, 2017
- Co-Chaired the 8th World Congress on Industrial Process Tomography (WCIPT8) in Brazil (September26-29, 2016)
- Co-Founded and Co-Chaired the international conference on "Catalysis for Renewable Sources: Fuels, Energy, Chemicals", Tsars Village, St. Petersburg, Russia, June 28 – July 2, 2010

- Chaired and Organized the GLS9 (Gas-liquid-Solid reactors engineering) conference as part of the 8th World Congress on Chemical Engineering (WCCE8), Montreal, Canada, August 23-28, 2009
- Co-Founded a new international conference on Bioenergy, and Co-Chaired "Bioenergy I: from concept to commercial production", Tomar, Portugal, March 5-10, 2006, and "Bioenergy II - Fuels and Chemicals from Renewable Resources", March 8-13, 2009 – Brazil, Rio de Janeiro organized by Engineering Conferences International (ECI), New Your, NY, USA

2003-2008 Co-Leading NSF engineering research center, center for environmentally beneficial catalysis (CEBC), University of Kansas (Head quarter), University of Iowa, Washington University in St. Louis, and Prairie view A&M University

2002-2007 Member of the advisory committee of the International Bhurban conference on applied sciences and technology, Pakistan

2002-2006 Spearheaded revamping of the capstone design course to be executed under industrial mentoring and projects for all the students with the involvement of Solutia, Monsanto-Enviro Chem, ConocoPhillips Refinery, Mallinckrodt, EHV-Weidmann Industries, and SIU bioethanol pilot plant

2000-now Member of scientific – technical - organizing committees of many technical national and international conferences and symposiums

1999-2008 Directed consortium, gas-to-liquid (GTL) fuels and chemicals using slurry bubble columns sponsored by ConocoPhillips (USA), Eni Technology (Italy), Johnson Matthey Catalyst (UK) (2006-2008), Sasol (South Africa), Statoil (Norway).
Organized technical review meetings twice a year in the premises of the sponsored companies

1999-2008 Organized technical review meetings twice a year for the high pressure slurry bubble column consortium supported by Air Products and Chemicals, Conoco, Sasol (South Africa), Statoil (Norway), Johnson Matthey Catalyst (UK), with DuPont, Ohio State University and Rensselaer Polytechnic Institute participation

1995-now Developed state-of-the-art and advanced multiphase flow and multiphase reactors research laboratory which became world resource as one of the unique laboratories in USA and the world that integrate sophisticated measurement techniques, laboratory to pilot plant scales setups and rigs and advanced computational, modeling and scale up/scale down techniques

1995-now Supervised the development of new undergraduate experiments and integrating research facilities into undergraduate experiments for chemical engineering laboratory courses

1995-now Founded, Co-Founded, Chaired and Co-Chaired many technical sessions in national and international conferences

1995-now Consultant to many US and international energy and chemical companies, research centers, and universities. Selected examples: US Department of State, CRDF, IREX, KISR (Kuwait institute of scientific research) (Kuwait), IAEA (Austria), Idemitsu (Japan), DuPont, Dow Chemicals, Synsel, Rentech, Sub-S Corporation, Adaptive ARC, ADM, Catalysis Group, Nuclear Malaysia (Malaysia), Institute Mexico de Petroleum (IMP) (Mexico), Delta T, Syntroleum, Rentech, ADM, SABIC, (Saudi Arabia), King Abdulaziz University (Saudi Arabia), HOK Group, ExxonMobil, Chevron, ChevronPhillips Chemicals, Sasol (South Africa), UiTM (Malaysia)

1995-now Offered, Co-Offered, Developed and Co-Developed short courses/workshops and lectures to engineers and scientists from industry, universities and research centers as follows:

- *Multiphase Reactors Engineering and Technology*
  - Institute of Engineering and Applied Science (PIEAS), Pakistan (2018), Institute Mexico de Petroleum (IMP) (Mexico City, 2017), International Mexican Congress on Chemical Reaction Engineering, IMCCRE (Acapulco, Mexico 2014), Kuwait Institute for Scientific Research (KISR) Kuwait National Petroleum Company (KNPC) (Kuwait 2013), ChevronPhillips Chemical (Houston, TX 2008), Chevron (San Francisco, CA 2008), ExxonMobil, Fairfax (Fairfax, VA 2007), and ExxonMobil, Clinton (Clinton 2007), Eastman Chemicals (Kingsville, 2007), Rentech, (Denver, CO, 2007), Syntroleum, (Tulsa, OK, 2006), Sasol Inc., (South Africa, 2006), ADM (Decatur, IL, 2006)
- *Quality Assurance and ABET Accreditation for Engineering Education*

- UNESCO Rehabilitation of Iraq's Higher Education System Towards Quality Improvement of Engineering Programs in All Iraqi Universities faculty members from 12 Iraqi Universities, Department Chairs, Deans, Officials of Ministry of Higher Education and Scientific Research organized by UNESCO (U. of Baghdad, Al-Mustansiriyah U., U. of Kufa U., U. of Wasit, U. of Babylon, U. of Al-Qadisiyah, Al-Muthanna U., U. of Thi-Qar U., U. of Basrah, U. of Misan, U. of Anbar, Al-Mousel U.) (2010-2016)
- University of Technology, Baghdad, Iraq – December 31, 2013
- Tikrit University, Iraq, Dec. 16-20, 2012

- *Imaging and Visualization using Nuclear Technology for multiphase flow and reactors research and for industrial processes*
  - South America, Central America and Caribbean countries, (sponsored by International Atomic Energy Agency, IAEA) on Capacity Building for Industrial Tomography Applications, Nuclear and Energy Research Institute (IPEN-CNEN), (Sao Paulo, Brazil 2018); National Workshop on Applications of Nuclear Techniques in Industry Sponsored by IAEA and KISR-Kuwait, (Kuwait, June 25-26, 2013); 12 Asia countries, (sponsored by IAEA), Kula Lumpur (Malaysia 2010); Korea Atomic Energy Research Institute, KAERI, (sponsored by IAEA), Seoul (Korea, 2009); University of King Abdulaziz – Jeddah for training engineers and faculty (India, Bangalore, Dec. 21-25, 2009);, Nuclear Malaysia and Malaysia National University (sponsored by IAEA), Kula Lumpur (Malaysia 2008), 3rd World Congress on Industrial Process Tomography – Banff, Canada (2003)
- *Chemical and Biological Safety and Security (CBSS) Laboratories*
  - Workshops to Iraqi graduate students in USA and around the world (over 500 graduate students were trained before they returned to Iraq) organized by Sandia National Laboratory sponsored by US Department of State and US Department of Defense (December 2017 – present)
  - Workshop to faculty members (over 60) from 6 Iraqi universities (U. of Anbar, Al-Mousel U., Nineveh U., U. of Fallujah, Tikrit U., Samarra U.) from the cities liberated from ISIS, sponsored by US Department of State through CRDF – Amman Office, Jordon (Sept. 25-29, 2017)
  - Workshop on university chemical safety and security frame work, "Best Practices for Implementing Chemical Safety and Security in Iraqi Universities", Organized by US Pacific Northwest National Lab (PNNL) sponsored by US Department of State, Istanbul, Turkey, September 13-17
- *Research Methodology*
  - Ministry of Science and Technology, Baghdad, Iraq, (Dec. 2010) for over 50 scientists and engineers
- *Exploring Waste-to-Energy Technologies covering "Anaerobic Digestion of Animal and Farm Wastes For Bio-Energy Production and Clean Environment"*
  - Half Moon LLC (for registered engineers, 2010), St. Louis (Clayton), MO, July 13, 2010

1994-2008 Co-Directing the Chemical Reaction engineering laboratory (CREL) as Industrial – Academia Consortium sponsored by industry (ADM, BP, Chevron, ConocoPhillips, DuPont, Eastman Chemicals, Eni (Italy), ExxonMobil, Johnson Matthey (UK), Sasol (South Africa), Shell, Statoil (Norway), Total (France) and UOP) with Ohio State University and Rensselaer Polytechnic Institute participation as partners
Organized technical annual meetings at Washington University in St. Louis with sponsored companies

II. Reviewing Programs and Process Designs Activities and Contributions

2019-2020 Reviewed and proposed modifications of the biotechnology curricula of College of Biotechnology, University of Al-Qadisiyah

2019, 2010-11, & 2014-15 Reviewed Strategic Planning – Petroleum Research Center, Kuwait Institute for Scientific Research (KISR) – Kuwait, 7th, 8th and 9th Strategic Plans

2019 Reviewed undergraduate chemical engineering program for the advancement of Qatar University

2019 Reviewed the Professional Engineering Exam for Saudi Arabia Chemical Engineers assigned to King Saud University – Riyadh – Saudi Arabia

2015-now Reviewed Chemical Engineering Programs as ABET Program Evaluator (PEV) of Sultan Qaboos University (Oman) (2019), Texas Tech University (TTU) (2017), New Mexico Institute of Mining and Technology (NMIMT) (2016), Louisiana State University (LSU) (2015) and Nuclear Engineering Programs as ABET Program Evaluator (PEV) of South Carolina State University (SCSU) (2019), Virginia Commonwealth University (VCU) (2018)

2013-2014 Reviewed and approved the design and the process of Al-Daghara municipal wastewater treatment plant designed by Mitsubishi, Japan, Al-Qadisiyah Province, Diwaniyah, Iraq

2012 Reviewed and provided feedback for establishing PhD program in Chemical Engineering at King Abdulaziz University – Jeddah – Saudi Arabia, May 2012

2011-2012 Reviewed and proposed modifications of the design and operation of the ADM Plant, Decatur, Illinois, USA and helped properly operating and performing the plant for new process related to processing the Glycerin byproduct of biodiesel production

2011 Reviewed (as a member of a selected team sponsored by UNESCO) the scientific research in Iraq: situation and perspectives, Beirut, Lebanon, September 27-28, 2011

2010-2016 Reviewed the self-study reports of 12 Engineering programs of Iraqi Universities (U. of Baghdad, Al-Mustansiriyah U., U. of Kufa, U. of Wasit, U. of Babylon, U. of Al-Qadisiyah, Al-Muthanna U., U. of Thi-Qar, U. of Basrah, U. of Misan, U. of Anbar U., Al-Mousel U.) UNESCO - UN expert on Quality Assurance of Higher Education

2009 Reviewed the chemical engineering curriculum and program of UiTM University in Malaysia – Shah Alam, February, 2009

III. Reviewing Proposals, Promotions and Technical Papers Activities/Services (1995-now)

- Reviewed proposals for DOE (1995–now), Nuclear Energy University Program (NEUP) – DOE, (2010-now)
- Reviewed proposals for NSF and member of NSF proposals reviewing panels (2005-now)
- Reviewed proposals for national and international funding agencies (e.g. Petroleum Research Fund (PRF), San Diego State University - Research Foundation, US civilian research and development foundation (CRDF), NSERC/CRSNG-Canada, Volkswagen Foundation-Germany, Ministry of Science and Technology – Slovenia, and others) (2004-now)
- Reviewed promotions to Associate Professors and to Full Professors and for tenured for US universities and international universities (2005-now)
- Reviewer to many technical Journals such as for example Chemical Engineering Science, AIChE J., I&EC Research, J. of Powder Technology, Biotech. and Bioengr. J., Biomass and Bioenergy J., Nuclear Engineering and Design, Experimental Thermal and Fluid Science, Progress in Nuclear Energy, Journal of Nuclear Energy, Canadian Journal of Chemical Engineering, Catalysis Today, Chem. Engr. Comm., Chem. Engr. Educat., Flow Measurement and Instrumentation, Trans. IChemE, and others.

IV. Consultations (1999-now)

Provided consultations to many US and international energy and chemical companies, research centers and universities, for selected examples:

- ***From 2009-now:*** KISR (Kuwait institute of scientific research) (2010-2019), US Department of State and CRDF (August – October 2017), Dow Chemicals (2013-2017), Synsel (2012-2019), Rentech (2012), Sub-S Corporation (2011-2019), Adaptive ARC (2011-2013), ADM (2010-2011), The Catalysis Group Resources (2009-2010), Nuclear Malaysia (2004-2010), Institute Mexico de Petroleum (IMP) (2004-Present)
- ***From 1999 – 2008:*** Detla T, Syntroleum (Tulsa, OK), Rentech (Denver, CO), ADM (Decatur, IL), SABIC (Riyadh, Saudi Arabia), King Abdulaziz University (Jeddah, Saudi Arabia), HOK Group (St. Louis, MO), ExxonMobil, Shell, Chevron, ChevronPhillips Chemicals, IAEA (Vienna), Sasol (South Africa), UiTM (Shah Alam, Malaysia)

AFFILIATIONS

American Institute for Chemical Engineers (AIChE) – life time member – AIChE Fellow
American Chemical Society (ACS)
American Nuclear Society (ANS)
American Society of Engineering Education (ASEE)
Tau Beta Pi
International Society for Tracer and Radiation Applications (ISTRA)
International Society for Industrial Process Tomography (ISIPT)

SELECTED TECHNICAL INTERACTIONS WITH ACADEMIA, NATIONAL LABORATORIES AND INDUSTRY

I. Technical and Educational Interactions with Academia and Research Centers – Selected Examples

- **Missouri S&T**
  Kamal Khayat (Civil. Arch., and Environmental Engineering), Joontaek Park (Chemical and Biochemical Engineering, ChBE), S. Usman (Nuclear Engineering, NE), C. Castano (NE), Y. Lee (NE), R. Kumar (NE), G. Mueller (NE), A. Rownaghi (Chemical and Biochemical Engineering, ChBE), F. Rezaei (ChBE), J.C. Wang (ChBE), J. Smith (ChBE), J. Schlegal (NE), S. Hosder (Mechanical and Aerospace Engineering, MAE), P. Nam (Chemistry), S. Dunn-Norman (Petroleum Engineering)
- **USA**
  H. Zhaozheng Yin (stony Brook University, Computer Sci., 2019-Present), Chad Xing (University of Missouri-Columbia, Chem Eng., 2018-2020), Neven Ali, (Nuclear Eng., University of New Mexico, 2017-Present), Marcus Foston (Washington University, Energy, Environ. and Chem Eng., 2017-Present), S. Murad (IIT, Chicago, Chem. Eng., 2013-2020), Rizwan Uddin (University of Illinois, Nuc. Eng, 2012-Present), T. Hendle (Iowa State University, Mech. Eng., 2012-2014), Brian Woods (Oregon State University, Nuc. Eng., 2012-2016), H. Yassin (Texas A&M, Nuc. Eng., 2011/2012), M. Ramzi (California State University, Sacramento, Civil Eng., 2011-2016), M. El-Genk (Nuc. Eng., University of New Mexico, 2010), VK Mathur (University of New Hampshire, Chem. Eng., 2009-2015), G. Thoma (University of Arkansa, Chem. Eng., 2007), R. Gardner (North Carolina State University, Nuc. Eng., 2007-2012), Loyalka and his team (University of Missouri-Columbia, Nuc. Eng., 2005-2013), J. O'Sullivan (Washington University, Elect. Eng., 2003-2009), J. Gleaves (Washington University, Chem. Eng., 2002-Present), Pratim Biswas (Washington University, Energy, Environ. and Chem Eng., 2002-2020), G. Froment (Texas A&M, Chem. Eng., 2000-2017), Bala Subramaniam and RV Chaudari (University of Kansas, Chem. Eng., 2000-2008), Tomasz Wiltowski (Southern Illinois University, Energy Eng., 1998-2008), Late Steve Antal and R. Lahey (RPI, Mech. Eng., 1998-2008), L. S. Fan (Ohio State University, Chem. Eng., 1998-2012), Milorad Dudokovic (Washington University Energy, Environ. and Chem Eng., 1994-Present), P. Mills (Dupont and Texas A&M, Kingsville, Chem. Eng. and Gas Process Eng., 1994-Present), P.A. Ramachandran (Washington University, Energy, Environ. and Chem Eng., 1994-Present)

- **International**
  Rachid Benhida and Yousef Elmabkhut (University of Mohamed 6th Polytechnic, UM6P, Morocco, 2019-Present), Juma Gailani (Mazoon and Baian University, Oman, 2019-Present), Nasser Zouli (Jazan University, Saudi Arabia, 2019-Present), Atta Ullah and Alam Nawaz (PIEAS, Pakistan, 2018-Present), Yousef Al-Anazi (Technical College, Kuwait, 2018-Present), Mahmoud Taha (Zewail City for Science and Technology, Egypt, 2018-Present), Mohd Fitri (Nuclear Malaysia, 2017-Present), T. Masa (Chiba University, Japan, 2016-Present), A. Badran (Petra University, Jordan, 2015), M. Al-Anazi (Kuwait University, Kuwait, 2015-2017), Hamza AlBazaz (KISR, Kuwait, 2014-Present), Meena Maarafi (KISR, Kuwait, 2010-Present), Y. Yassin (Al-Nahrain University, Iraq, 2013-2016), M. Al-Mesfer (KKU, Saudi Arabia, 2013-Present), Q. Wang (Nuclear Research Center, Vietnam, 2013-2017), M. Kagumba (Kenya Technical University, Kenya, 2013-Present), Bill (Cape Town University, South Africa, 2012-2015), BilKassim (OCP, Morocco, 2012-2015), E. Erkoc (Bursa Technical University, Turkey, 2012-Present), S. Jasim (Nottingham University, UK, 2011-Present), R. Al-Mihadi (Snowbird Technical University, Australia, 2011-Present), Vishnu and H. Znad (Perth University, Australia, 2010- Present), W. AlMasri (KSU, Saudi Arabia, 2010-Present), X. Lan (University of Petroleum, China, 2010-Present),

Institute of Catalysis (Russia, 2009-2010), M. Al-Johani (KAU, Saudi Arabia, 2009-2018), M. Al-Rubaie (University College Dublin, Ireland 2009-Present), Uwe Hampel (Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany, 2009-Present), AbdulAzim Maarafi (KISR, Kuwait, 2008-Present), A. Schumpe (Technical University of Braunschweig, Germany, 2008-2012), S. Limtrakul (Bangkok University, Thailand, 2008-2015), R. Williams (University of Leeds, UK, 2008-2015), Suresh (IIT Bombay, India 2008-2017), Mao (China National Academy of Science, China, 2008-2017), A. Eidan (American University Al-Sharqua, UAE, 2008-Present), M. Rafiq (Pakistan, 2007-2012), H. McCane (University of Manchester, UK, 2007-2016), S Nedeltechev (Bulgarian S&T Res. Center, 2006-2015), Sabri (KUM, Malaysia, 2006-2010), A. Prakash (Western Ontario University, Canada, 2005-2012), D. Parker (University of Birmingham, UK, 2005-2012), G. Johanson (University of Bergen, Norway, 2005-Present), Warsito (Ministry of S&T, Indonesia, 2004-2012), V. Ranade (NCL, India, 2004-2018, Queens University Belfast, UK, 2018-Present), J. Anchyta (IMP, Mexico, 2004-Present), Margarida Hamada, Paplo, Carlos and Calvo (Brazil, 2004-Present), Berthold (Sasol, University of Twente, Netherland, 2002-2008), F. Tunge and J. Shafiq (Total, 2002-2017), J. Abdulla (Nuclear Malaysia, Malaysia, 2002-Present), T. Bauer (University of Dresden, Germany, 2000-Present), Pascal Fongarlan (France, 2000-2002), N. Papayannokos (National Technical University, Athens, Greece, 2000-2006), J. Fernandez and Emilio (Almeria University, Spain, 2000-2008), Miryan Cassanello (University of Argentina, Argentina, 2000-2009), Wild (NANC, France, 2000-2009), N. Willie (University of Pretoria, 2000-2013), C. Boyer (IFP, France, 2000-2010), S. Roy and Nigam (IIT Delhi, India, 2000 – Present), R. Mudde (Delft Technical University, Netherland, 1998-2019), JB Joshi (UDCT, IIT Delhi, India, Louisiana State University (LSU), USA, 1998-Present), F. Larachi (Laval University, Canada, 1996-Present), J. Chaouki (Ecole de Montreal, Canada, 1996-Present), Y. Wu (Wuhan Chemical Technology University, 1994-2018), R. Lange (University of Dresden, Germany, 1994-Present)

Iraqi Institutions: Mahdi Eidan (Ministry of Higher education and Scientific Research, Iraq, 2019-Present), Faris Hamoudi (University of Technology, Iraq, 2018-Present), H. Taofeeq (Al-Nahrain University, Iraq, 2018-Present), Laith Sebri and Abbas Sultan (University of Technology, Iraq, 2018-Present), S. AlBasri (University of Baghdad, Iraq, 2015-Present), M. Zangana, F. Ibrahim (University of Koya, Kurdistan, Iraq, 2015-Present), Saba Gheni (University of Tikrit, Iraq, 2008-Present), G. Alwan (University of Technology, Iraq, 2010-Present), Amer Daham (University of Al-Qadysia, Iraq, 2009-Present),

II. Technical Interactions with National Laboratories – Selected Examples

2015	Pacific Northwest National Laboratory, Laboratory safety and security
2014-now	Los Alamos National Laboratory, and Oak Ridge National Laboratory, 4th generation nuclear reactors proposals submission to DOE
2012-now	Oak Ridge National Lab and Idaho National Laboratory, USA, Natural convection heat transfer in prismatic block reactors. Also collaborating on proposals submission to DOE
2008-2012	Idaho National Laboratory, Scale up of gas-solid spouted beds and solid and gas dynamics on moving packed pebble bed reactors and collaboration on proposals
2002-2005	Sandia National Laboratory, Flow mapping of gas-solid riser
2000-2006	Oak Ridge National Laboratory, Performance of anaerobic digesters
1999	Sandia National Laboratory, USA (1999): Multiphase velocity measurements in a gas-solid riser via radioactive particle tracking (RPT)

III. Technical Interactions with Industry – Selected Examples

2020-now	DSM Nutritional Products, USA and its research center in The Netherlands
2019-now	Framatome, on Pebble bed nuclear modular reactors
2019-now	DuPont, on hydrodynamics of trickle bed reactors for chemical production
2016-now	Idemitsu Kosan Co., Ltd, Japan on on-stream catalyst replacement and trickle bed reactors hydrotreating
2016	Veolia, USA/France on spent molecular sieve and spent catalyst reuse, treatment and disposal
2015	SABIC, USA, on ethylene production from acetylene hydrotreating
2013-2018	Dow Chemicals, USA, Development of liquid-liquid contactors for reaction and mass transfer studies (Dow Al-Dahhan Cell)
2013-2018	Areva on prismatic block nuclear reactor

2013-2017 Westinghouse on small modular nuclear reactor and pressurized water reactor benchmarking data
2013-2014 Shell, USA, Implementing gamma ray densitometry to identify and characterize deposits on petroleum process pipes (Up-stream/down-stream)
2013-2014 Synsel, USA, Assessing and investigating integrated synthetic biodiesel production plant – Based on biomass and stranded natural gas
2012-now Mynah, USA, Developing virtual experiments using "MiMiC simulation Software" integrated with Emerson DeltaV for virtual experiments of undergraduate unit operations experiments and their process control
2012-now Emerson, USA, Establishing state-of-the-art process control system for undergraduate unit operations laboratories including DeltaV industrial process control software
2012-now Molecular Filtration, Dallas, Texas, Inc., on water and waste water treatment via intensification membrane technology
2012-2016 Chevron Technology on scale-down on-stream catalyst replacement reactor
2012-2014 Adaptive ARC, USA, Modeling Adaptive ARC moving bed biomass gasifier
2012-2013 Rentech, USA, Assessing the risks and their mitigation for scale up pilot plant reactor for alternative fuel production - slurry bubble column reactor
2011-2012 ADM, USA, Assessing and troubleshooting the aqueous based hydrotreating trickle bed reactor
2010-now KISR-KNPC, Kuwait, Evaluation of the performance of the moving bed, two phase flow hydrotreating reactors, IAEA projects, reviewing strategic plans
2009-2010 The Catalysis Group Resources, USA
2008 Central Ethanol Company, Sauget, Illinois and Genencor for trying on the commercial plant our enzymatic development to increase ethanol yield and reduce the emission and energy use, USA (2008)
2006-2007 ExxonMobil, USA, Hydrodynamics of bubble column with and without internals for clean energy production
2006-2007 Total, France (2006/2007), High pressure gas and liquid flow distribution in a trickle bed reactor
2006 Ineos Nitriles, USA, Hydrodynamics of Fluidized Reactors
2005-2007 Syntroleum, USA, Fischer-Tropsch (FT) reactor modeling and analysis
2004-2005 ChevronTexaco, USA, Assessing a bubble cap distributor design for its flow distribution using gamma ray tomography
2002-2008 Iowa Energy Center, USA, Pilot plant anaerobic digester
2002-2005 Total, France, Liquid maldistribution in trickle bed reactors and performance of various distributor designs: experimentation and CFD modeling study
2002-2004 ANSYS/Fluent, USA, Validation Computational Fluid Dynamics (CFD)
2002-2004 Snamprogetti, Italy, Study of bubble column reactor operated in bubbly flow regime for Hydro-conversion of heavy oils and petroleum feedstock
2002 Chevron, USA, Solids dynamics of circulating fluidized bed
2001-2004 Bayer, Germany, Performance and characterization of structured packed bed
2000-2002 ABB Lummus Global, USA, Phase distribution in two-phase countercurrent flow packed beds with structured packing
2000-2002 ABB Lummus Global, USA, Hydrodynamics and mixing of up-flow liquid-solid System for alkylation
2000-2001 Air Products and Chemicals, USA, Flow distribution in laboratory and pilot plant fixed beds of structured packing catalytic system
2000-2001 DuPont, USA, Gas-solid riser studies
1999-2009 ConocoPhillips (USA), Eni (Italy), Johnson Matthey Catalyst (UK), Sasol (South Africa), Statoil (Norway), Syngas conversion to clean alternative fuels and chemicals using slurry bubble column reactors Consortium & Research Program
1999-2003 Air Products and Chemicals/US Department of Energy (DOE), Advanced diagnostics techniques for three-phase slurry bubble column reactors
1998-1999 UOP, USA, Hydrodynamics study of ebullated beds
1997-1998 Chevron, USA, Particle motion in gas-liquid up-flow packed bed for petroleum hydrotreating (OCR)
1996-1997 DuPont, USA, Hydrodynamics and mixing in counter-current staged bubble column

1996 Monsanto, USA, Scale-up and Design of High Volumetric Productivity and High Selectivity reactor for the production of amino alcohol
1995-1999 Exxon Engineering Foundation, USA, Kinetics and reactor analysis for improved petroleum refining/hydroprocessing
1994 Exxon Research and Engineering, USA, Periodic operation of trickle-bed reactors

NEWS AND THE MEDIA

2021 Video on Known Scientists born in Iraq
2020 Facebook, Kasim Al-Samawi article in Arabic with 585 positive comments and 70 share as of November 26, 2020
2013-2014 The media around the world on my achievements on pebble bed nuclear reactor, 4th Generation nuclear power,
2013 Front page of The Rolla Daily News, Vol. 139, No. 91, Friday, April 19, 2013 with the Chancellor and donors for Bertelsmeyer Hall
2013 Front page of The Rolla Daily News, Vol. 139, No. 90, Thursday, April 18, 2013 on "S&T focuses on next-generation nuclear reactors" covered my research
2013 Missouri S&T Magazine as my research laboratory is the only laboratory of its kind in the nation and about S&T to lead small modular reactor consortium, Missouri S&T Magazine, Fall/Winter 2013, Page 8
2013 Missouri S&T "research", under the title "Going with the flow", Fall, 2013
2013 Brochure by Human Resources Division, Manpower Development Department of Kuwait Institute for Scientific Research (KISR), for the short course on Multiphase Reactors Engineering and Technology, December 22-26, 2013
2012 Missouri S&T "research", Fall 2012, Page 5
2011 Quarterly Magazine of the Al-Muthanna University, Picture in front page, No. 5, February, 2011, Page 13
2009 The Magazine of the Department of Energy, Environment and Chemical engineering, Experimental Facility and Graduate Students, Washington University in St. Louis, Issued in 2009
2008 St. Louis Magazine - October 2008 Issue, page 61 - 68 – Featured on "The Alternative to Alternative Energy" – as one of three St. Louis researchers who are looking for alternative energy sources
2008 The Rolla Daily News, Thursday December 4, 2008, Page 6
2008 Washington University Newspaper, Record, covering my research, 2008
2008 Featured by 81 leading media, news and press agencies worldwide about the recent

FUNDING

(PI) Principal Investigator, (Co-PI) Co-Principal Investigator, (Co-I) Co-Investigator

I. Grants, Contracts and Gifts

70 (PI) Hydrodynamics Study of a Trickle Bed Reactor: Phase 2 – Computational modelling, DuPont, in amount of **$60,000** (May 1, 2021- April 30 2022).
69/ (PI) Working on finalizing agreement with Kuwait Institute of Scientific Research on Data Analysis of Electrochemical Reaction in amount of **$45,000**
68. (PI) Study of bubble size distribution and gas hold-up in real algal fermentation broth and in model solutions: DHA Fluid Dynamics Investigation, DSM Nutritional Products, LLC, **$80,000** (May 1, 2021-April 30, 2022)
67. (PI) Robust bullet-time tagging and tracking system based on computer vision for individual ex-core TRISO-fueled pebble identification, RC-4.2: Robust Individual TRISO-Fueled Pebble Identification Method for Ex-Core Evaluation, DOE-NEUP, Co-PIs: H. Zhaozheng Yin (stony Brook University), Zain Karriem (Idaho National Laboratory), David Cislo (Framatome), Total: **$800,000**, October 1, 2020 to September 30, 2023
66. (PI) College of Engineering and Computing (CEC) Distinguished Professor research fund, **$40,000** (September 1, 2019 - December 31, 2020)
65. (PI) Impurities Penetration in Hydrotreater Trickle Bed Reactors using Radioactive Particle Tracking Technique, Idemitsu, Japan, **$60,000** (July 1, 2020- December 31, 2020)

64. (PI) Phase holdup distribution in trickle bed reactor using Gamma Ray Computed Tomography (CT) and optical fiber probe techniques, Idemitsu, Japan, **$15,000** (December 1, 2019- September 30, 2020)
63. (PI) Experimental hydrodynamics study of a trickle bed reactor (for chemical processes), DuPont, **$65,161** (June 10, 2019 – May 8, 2021)
62. (PI) Integrating processes for ground water treatment (IREX Water) with Al-Qadisiyah University (Dr. Amer Daham, PI, Iraq) **$42,950** (Sept. 1, 2019- Aug. 31, 2020)
61. (PI) Updating the biotechnology curriculum for the biotechnology College, (IREX Biotechnology with Al-Qadisiyah University, (Dr. Ferdous Abbas Jabir, PI, Iraq), **$32,940** (Sept. 1, 2019- Aug. 31, 2020)
60. (PI) Enhancing shielding properties of high-strength self-consolidating concrete for nuclear containing buildings by rheology control, Advanced Materials for Sustainable Infrastructure (AMSI) (with Kamal Khayat, Civil Engr. as Co-PI), **$7,838** (June 1, 2018 – June 30, 2019)
59. (Co-PI) Rheology-based modeling and design of self-consolidating concrete under varied casting pressure, Advanced Materials for Sustainable Infrastructure (AMSI), (PI- Kamal Khayat, Civil Engr.), **$15,676** (Jan. 1, 2018 – June 30, 2019)
58. (PI) Imaging of phases distribution in on-stream catalyst replacement (OCR) and trickle bed reactors, Idemitsu, Japan, **$150,000** (October 1, 2017- September 30, 2020)
57. (PI) Non-Invasive imaging of fiber-reinforced concrete in fresh and hardened states using advanced gamma ray computed tomography and radioactive particle tracking techniques, Advanced Materials for Sustainable Infrastructure (AMSI), (with Kamal Khayat, Civil Engr. as Co-PI), **$15,732** (June 1, 2017 – May 31, 2018)
56. (PI) Analytical Equipment (GC-MS and HPLC) for undergraduate laboratory and graduate research, College of Engineering and Computing, Total: **$135,000** ($50,000 and External Matching $85,000) (Spring 2017)
55. (PI) Improvement of pilot plant unit testing through reaction engineering approach for better mimicking catalytic hydroprocessing, Kuwait Institute for Scientific Research (KISR) **$193,258** (February 2, 2017-February 14, 2018)
54. (PI) Pre-treatment and disposal of expired (used) molecular sieves (catalysts) in petroleum industry in Iraq. Jointly with Koya University – Kurdistan – Iraq, US States Department through IREX (International Research and Exchange Board), **$50,000** (March 2016-February 2017)
53. (PI) Gift in support of the research for imaging and visualization of multiphase reactors using RPT and CT, Dr. M. Al-Johani, Nuclear Engineering Department, King Abdulaziz University, Saudi Arabia, **$10,000** (2016)
52. (PI) Experimental and computational investigations of plenum-to-plenum heat transfer under natural circulation in a prismatic very high temperature reactor, (Co-PIs: Rizwan-Uddin, University of Illinois, Urbana-Champion, Usman – Missouri S&T, Co-Is: Jain - ORNL, Southworth – Areva, Woods – Oregon State University), NEUP – DOE, **$799,999** (February 2014 – February 2018)
51. (Co-PI) Computational Fluid Dynamics (CFD) Model Verification and Validation Using Advanced Non-Invasive Visualization Technique for Scaled-Down Core of Westinghouse SMR, SMR Consortium (PI-Joseph Smith), **$74,071** (for year one – January, 2014-2015)
50. (PI) Identification of the type and thickness of deposits on crude oil transportation pipes, Shell, Houston, **$29,900** (March 2013-February 2014)
49. (PI) Modeling of Adaptive ARC ce25 Plasma based biomass gasifier, Adaptive ARC, **$75,000** (May 1, 2012 for one year)
48. (PI) Performance evaluation of Mina on-stream catalyst replacement (OCR) reactor through cold flow modeling and sophisticated techniques, Kuwait Institute for Scientific Research (KISR), Kuwait, **$899,748** (November 2012 – December 2016)
47. (PI) US State Department fellowship through CRDF, CRDF, **$14,000** (June-December, 2012)
46. (PI) Advancing microalgae culturing for efficient bioenergy production via dynamic growth, mass transfer and bubble dynamics investigations, Energy Research and Development Center – Missouri S&T, **$11,100**, 2011/2012

45. (PI) US State Department fellowship through CRDF, CRDF, **$14,333** (April 1 to October 31, 2011)
44. (Co-PI) Infrastructure Upgrade of Radiation Measurement and Spectroscopy Laboratory at Missouri S&T, DOE-NEUP, PI: H. K. Lee, Co-PIs: S. Usman, X. Liu, M. Al-Dahhan, Total: **$350,000**, ($50,000 cost sharing), September 1, 2012 to August 3, 2013
43. (Co-PI) Upgrade of Missouri S&T reactor for distance learning, PI: A. Alajo; Co-PIs: A. Kumar, M. Al-Dahhan, P. Whitefield, DOE-NEUP, Total: **$314,260** ($200,000 plus University match of $114,260) (December 7, 2011 to December 7, 2012
42. (Co-PI) Upgrade the cooling system of S&T nuclear reactor, PI: A. Kumar; Co-PIs, Muthanna Al-Dahhan, Phil Whitefield, W. Huebner, M. O'Keefe, DOE-NEUP, Total: **$250,000** ($200,000 plus University match of $50,000) (August 2010 - August 2011)
41. (Co-PI) Nuclear infrastructure upgrade to enhance research and teaching capabilities at Missouri S&T, PI: G. Mueller; Co-PIs: H. K. Lee, A. Kumar, S. Usman, C. H. Castano, M. H. Al-Dahhan, DOE-Nuclear Energy University Program (NEUP), Total: **$350,000** ($300,000 plus $50,000 Univ. cost sharing), (August 31, 2010 - August 30, 2011)
40. (Co-PI) Creation of a radiochemistry teaching program in nuclear engineering at Missouri S&T, PI: C. H. Castano, Co-PIs: H. K. Lee, U. Usman, M. H. Al-Dahhan, Nuclear Regulatory Commission (NRC), Curriculum Development Grant, **$125,000** (July 1, 2010 - June 30, 2011)
39. (PI) Identification of various regime transitions in gas-liquid-(solid) bubble columns based on chaos and statistical analyses of radioactive particle tracking, gamma ray computed tomography, gamma ray densitometry, optical probe and differential pressure data, (Duration 36 months) (PIs: Al-Dahhan - USA (for the first 24 months), Schumpe, Germany – Technical University Braunschweig (for the last 12 months), Highly competitive grant from European Commission – Research Directorate-General, Euro 362,201.03 (~**US$ 507,081.44**) (November 1, 2009 – October 31, 2012), Missouri S&T Share ~ Euro 201,736 (~**US$ 282,430**)
38. (Co-PI) Gamma Ray Computed Tomography for multiphase flow systems, Saudi Arabia, KAST (Initiation of long term collaborative research, PIs: Al-Johani and Shahata-Saudi Arabia, Al-Dahhan – USA), Nuclear Engineering Department, King Abdul Aziz University, Jeddah, ~ **$533,333** (September 2009 – August 2013)
37. (PI) Advanced high temperature gas nuclear reactor (HTGR) consortium and research program (Pebble bed reactors) (PI-for the subcontract) in collaboration with University of Missouri – Columbia (Professors Loyalka (PI for the grant) and Gosh), and North Carolina State University (professor R. Gardner), DOE-NERI, total of **$3 Million**, my share is about ~**$1 Million** (September 30, 2007 – September 29, 2012)
36. (PI) Advancing the fundamental understanding and scale up of TRISO fuel gas-solid spouted bed coaters via advanced measurement and Computational Techniques, PI: M. H. Al-Dahhan, DOE-NERI, **$599,999** (September 1, 2007 – August 31, 2012)
35. (PI) Clean Alternative Energy using Slurry Bubble Column Reactors Consortium & Research Program for Fischer-Tropsch Synthesis funded by (ConocoPhillips (USA), Eni (Italy), Johnson Matthey Catalyst (UK), Sasol (South Africa), Statoil (Norway), (September 1, 2006 – December 31, 2011), **($375,000** total, my share is **$275,000**). Director of the consortium in collaboration with Ohio state University (Professor L.S. Fan (member of National Academy of Engineering) (Co-PI)) and Rensselaer Polytechnic Institute (Professors S. Antal and R. Lahey (member of National Academy of Engineering) (Co-PIs), ($50,000 per year for these universities)
34. (PI) Clean Alternative Energy using Slurry Bubble Column Reactors Consortium & Research Program for Fischer-Tropsch Synthesis funded by ConocoPhillips (USA), Eni (Italy), Sasol (South Africa) and Statoil (Norway), (April 1, 2003 – December 31, 2007), **($ 1 Million** total) (my share is **$700,000**), Director of the consortium with collaboration of Ohio State University (Professor L.S. Fan (member of National Academy of Engineering) (Co-PI)) and Rensselaer Polytechnic Institute (RPI) (professor Steve Antal and Professor R. Lahey (member of National Academy of Engineering) (Co-PIs), ($50,000 per year for these universities)

33. (PI) Clean Alternative Energy using Slurry Bubble Column Reactors Consortium & Research Program for Fischer-Tropsch Synthesis funded by Air Products and Chemicals (USA), ConocoPhillips (USA), Sasol (South Africa) and Statoil (Norway), (April 1, 1999 – March 31, 2003), **($600** total) (my share is **$450,000**), Director of the consortium with collaboration of Ohio State University (Professor L.S. Fan (member of National Academy of Engineering) (Co-PI)) and Rensselaer Polytechnic Institute (RPI) (professor Steve Antal and Professor R. Lahey (member of National Academy of Engineering) (Co-PIs), ($50,000 per year for these universities)
32. (PI) Hydrodynamics of Fluidized Reactors, Ineos Nitriles, **$45,000** (January 1, 2006 – December 31, 2006)
31. (PI) High Pressure Gas and Liquid Flow Distribution in a Trickle Bed Reactor, Total, France, **$100,000** (January 1, 2006 – December 31, 2007)
30. (PI) Improved Biomass Utilization in Digester through Remote Flow Sensing, DOE/Energy Efficiency Science Initiative, ~ **$2,098,687** (my share is about **$1.3 Million**) (July 1, 2001 – March 31, 2008) with collaboration of Oak Ridge National Laboratory and Iowa Energy Center
29. (PI) Flow Visualization of Polyethylene Gas-Solid Fluidization System, University of Twente, The Netherlands, **$45,000** (March 1, 2007 – March 31, 2008)
28. (Co-PI) Co-Leader in NSF Engineering Research Center – Center for Environmentally Beneficial Catalysis (CEBC) – University of Kansas (Head Quarters – Professor Bala Subramanian is the PI), Washington University as Core-Partner (Professors Dudukovic and Ramachandran as Co-Leaders) - and University of Iowa and Prairie view A&M University as Core-Partners, (for Washington University **~$350,000/year 1**; **~$420,000/year 2**; **~$460,000/year 3**; **~$520,000/year 4**; **~$560,000/year 5**) (September 2003- August 2008)
27. (Co-PI) Hydrodynamics of bubble column with and without internals for clean energy production, ExxonMobil, (PI: Professor Dudukovic), **$140,000** (January 2006 – June 2007)
26. (PI) Fischer-Tropsch (FT) Reactor Modeling and Analysis, Syntroleum, USA, **$100,000** (April, 2005 – March 2007)
25. (PI) Assessing a bubble cap distributor design for its flow distribution via CT, ChevronTexaco, **$20,000** (September 1, 2004 – December 31, 2005)
24. (PI) Study of Bubble Column Reactor Operated in Bubbly Flow Regime for Hydro-conversion of Heavy Oils and Petroleum Feedstock, Snamprogetti, Italy, **$164,753** (March 1, 2002 – December 31, 2004)
23. (PI) Liquid Maldistribution in Trickle Bed Reactors and Performance of various distributor designs: Experimentation and CFD Modeling Study, Total, France, **$67,298** (August 8, 2002 – December 31, 2005)
22. (PI) Performance and Characterization of Structured Packed Bed, Bayer, **$125,000** (July 1, 2001 – June 30, 2004)
21. (PI) Flow Mapping of Gas-Solid Riser, DOE, Albuquerque Office – Sandia National Laboratory, **$225,000** (April 1, 2002 – March 31, 2005) with collaboration of Sandia National Laboratory
20. (PI) Advanced Diagnostics Techniques for Three-Phase Slurry Bubble Column Reactors, DOE: **$380,095** (July 1, 1999 – June 30, 2003) Air Products: **$150,000** (July 1, 1999 – June 30, 2003) as a cost sharing, Total cost: **~ $543,371**
19. (PI) Phase Distribution in Two-Phase Countercurrent Flow Packed Beds with Structured Packing, ABB Lummus Global, **$55,000** (1/1/2000 – 1/1/2002)
18. (Co-PI) Engineering Development of Slurry Bubble Column Reactor Technology, DOE via Air Products (DOE-FC22-95PC95051) – Extension of the ongoing research for two more years, (PI: Professor Dudukovic), **$354,000** (10/1/2000 – 3/31/2002)
17. (PI) Flow Distribution in Laboratory and Pilot Plant Fixed Beds of Structured Packing Catalytic System, Air Products and Chemicals, **$70,000** (4/15/2000 – 10/14/2001)
16. (PI) Hydrodynamics and Mixing of Liquid-Solid Fluidized Reactor, ABB Lummus Global, **$155,000** (10/1/2000 – 6/30/2002)
15. (PI) Gas-Solid Riser Studies, DuPont, **$89,140** (6/8/2000 – 5/7/2001)

14. (Co-PI) Hydrodynamics of gas-solid riser, (PI: Professor Dudukovic), **$25,000**, Chevron, (March 1999 - March 2000)
13. (Co-PI) Engineering Development of Slurry Bubble Column Reactor (SBCR) Technology, **~$1,450,000**, Funded by DOE via Air Products and Chemical, Washington University (M.P. Dudukovic', PI) as a subcontractor (April 1, 1995 – March 31, 2000)
12. (PI) Support the research of an undergraduate student (Boon Tee Ong) from National University of Singapore working with me on mass transfer in trickle bed reactors, DuPont, **$12,000** (September 1 to December 31, 1999)
11. (Co-PI) Multiphase velocity measurements in a gas-solid riser via CARPT, (PI: Professor Dudukovic), **$75,000**, Sandia National -Laboratory, (June 1, 1999 – September 30, 1999)
10. (PI) Hydrodynamics study of Ebullated beds, **$70,000.00**, UOP, (January 1, 1998 – May 31, 1999)
9. (PI) Exxon Engineering Foundation Grant in Support of Research on Kinetics and Reactor Analysis for Improved Petroleum Refining/Hydroprocessing, Exxon Education Foundation, **$10,000** (1995/1996), **$10,000** (1996/1997), **$5,000** (1997/1999)
8. (PI) Particle motion in an ebullated bed, **$30,000.00**, Chevron, (1997/1998)
7. (Co-I) Novel Techniques for Slurry Bubble Column Hydrodynamics, **~$650,000**, Funded by DOE. The project is a joint research between Washington University (M.P. Dudukovic', PI) Ohio State University (L.S. Fan, Co-PI) and Exxon Research & Engineering Company (M. Chang, Co-Investigator) (July 1995 - June 1998)
6. (Co-PI) Liquid-Solid Recirculating Bed, (PI: Professor Dudukovic), **$60,000**, UOP, (1997)
5. (PI) Hydrodynamics and Mixing in Counter-Current Staged Bubble Column, **$60,000**, DuPont, (1996/1997)
4. (Co-PI) Liquid-Solid Recirculating Bed, (PI: Professor Dudukovic), **$93,775**, UOP, (1995/1996)
3. (PI) Evaluation of Liquid-Solid Mass Transfer in High Pressure Trickle-Bed Reactors, **$1000**, Engelmann Scholar Research Program-NSF Young Scholar Program Mentor, (summer, 1995)
2. (PI) Scale-up and Design of High Volumetric Productivity and High Selectivity Reactor for Production of Amino Alcohol, **$55,440**, Monsanto, (1996)
1. (PI) Periodic Operation of Trickle-Bed Reactors, **$17,000**, Exxon Research and Engineering Company, (1994)

II. Industrial Consortium at Washington University in St. Louis - Chemical Reaction Engineering Laboratory (CREL) (1995-2008) – Associate/Co-Director and Co-PI, $4 Million (Not Listed Above)

- I was instrumental as a Co-Director and Co-PI in expanding the industrial sponsorships of CREL since 1995 to 2008 (Director and PI: Professor M. P. Dudukovic). Each member company sponsors the consortium on unrestricted research in the amount of **$20,000** per year (the total **~ $300,000 to $400,000** per year). The CREL Industrial sponsors as of 2006 to 2008 were: ADM, BP, Chevron, ConocoPhillips, DuPont, Eastman Chemicals, Eni (Italy), ExxonMobil, Johnson Matthey (UK), Sasol (South Africa), Shell, Statoil (Norway), Total (France) and UOP (total of **$4 Million** from 1995 to 2008). These funds were spent of research or various unrestricted projects that benefit the sponsors and are not listed above.

  Successfully organized every year since 1994 to 2008 our laboratory annual technical meetings with industrial and governmental sponsors (1995-2008).

III. Funding on Educational Experiments

6. (PI) Sensors, mass flowmeters, flowmeters, pressure transducers, temperature measurements, control valves, pumps, and others to develop a unique instrumentation and control experiment integrated with Emerson Delta V, Emerson Subsidiaries (Experitec, Rosemount), (value of **~$300,00**), (2015/2016)

5. (PI) Integrating gas-absorption with Delta V as undergraduate experiment for unit operations laboratory courses, Phillips 66, **$60,000**, (2014)
4. (Co-PI) Modernizing Undergraduate Laboratory by Integrating Emerson Process Management Delta V and hardware and Mynah Mimic software for virtual experiments (PI, Dr. Sitton), Missouri S&T, **$100,000** (2014)
3. (PI) State-of-the-art process control system for undergraduate unit operations laboratories including DeltaV industrial process control software", Emerson Process management, (Co-PI, Dr. Sitton), Over **$432,371**, (2013-1014)
2. (PI) MiMiC simulation software to be integrated with Emerson Delta V for virtual experiments of undergraduate unit operations experiments and their process control, MYNAH Technologies, (Co-PI, Dr. Sitton), **$1.5 Million** (2013)
1. (PI) Gas Absorption Experiment for undergraduate unit operations laboratory", ConocoPhillips and its selected alumni, (Co-PI, Dr. Sitton), **$65,000** (including US$25,000 cost sharing from Provost Office) (2012-2014)

IV. Obtained Donated Research Equipment and Facilities

15. (PI) Two GCs from Phillips66, **~$50,000**, August (2016)
14. (PI) Pilot plant and lab scale units for water and wastewater treatment of membrane intensification unit, ion exchange units, and a reactor unit for resin treatment, Molecular Filtration Inc., **~ $50,000**, (2014)
13. (PI) Industrial scale pilot plant (18-inch diameter) bubble/slurry bubble column facility from ConocoPhillips, **~$600,000** (2009)
12. (PI) High temperature and high pressure bench scale process of 1 liter autoclave reactor at S&T from ConocoPhillips, **~$400,000** (2009)
11. (PI) High temperature and high pressure 1 liter autoclave reactor unit at S&T from ConocoPhillips, **~$50,000** (2009)
10. (PI) Mass spectrometer and GC at S&T from ConocoPhillips, **~$50,000** (2009)
9. (PI) Electrical Capacitance Tomography from DuPont at S&T, **~$ 90,000** (2008)
8. (PI) GC from Monsanto, **~ $10,000** (2002)
7. (PI) Hot gas-solid riser facility from DuPont, **~ $50,000** (2001/2002)
6. (PI) Laboratory scale of structured packing/monolith beds facility for hydrodynamics and mass transfer studies. This set-up will be as well used for undergraduate experiment, **~$15,000** (2002)
5. (PI) Glass-packed bed distillation column donated by Tosco Refinery (formerly Wood River Refinery) for undergraduate experiment, ~$15,000, (2000)
4. (PI) Bioreactors, University of Almeria, Spain as a part of the collaboration on advancing the modeling, design and scale up of multiphase bioreactors, **~ $10,000** (1999)
3. (PI) High pressure circulating hydrogen compressor loop to trickle bed reactors facility, Exxon Chemical, **$110,000** (1999)
2. (PI) Glass gas-solid riser for graduate research, DuPont**, ~$30,000** (1999)
1. (PI) Using Advanced Instruments (Fluke 702) by Students in Teaching/Research Chemical Engineering Laboratories, Fluke Corporation, **$4,887** (1995)

RESEARCH FACILITIES DEVELOPED

Multi-Phase Flow and Reactors Engineering, Applications and Education Laboratory (mFReael)

❖ ***I. State-of-the-art Advanced Measurement Techniques Laboratory***

- ***Non-invasive radioisotopes based imaging and visualization***

  These Techniques can be implemented on harsh environment and sever conditions for industrial applications

  - Radioactive particle tracking (RPT) techniques for liquid and solid phases to measure 3D flow field, velocity, turbulent parameters, and local and global residence times distribution
    - Two small and large sizes single particle techniques
    - Novel multi-radioactive particle tracking (M-RPT) technique (developed with Oak Ridge National Laboratory) to track up to 8 particles simultaneously that each can represent a phase or different group of solids

  - Fully automated in three direction movement calibration device for RPT and M-RPT techniques
  - Novel hybrid in-situ calibration and RPT and M-RPT techniques to transform them to industrial applications
- Gamma ray computed tomography (CT) to measure phases/densities cross sectional distribution and radial/diameter profiles
  - Single source gamma ray computed tomography technique
  - Novel dual source/energy computed tomography (DSCT) technique (developed with Oak Ridge National Laboratory)
  - New image reconstruction algorithm
- Sophisticated gamma ray densitometry (GRD) technique to measure phases/densities radial/diameter profiles, flow regime and flow pattern identification and reduced tomography
- Developed all the needed radiation safety procedures, protocols and training to make safe operation of these techniques and to maintain the license of the use of the radioisotopes

- ***Advanced measurement techniques for hydrodynamics, mass, and heat transfer, and mixing and dispersion***

  These Techniques can be implemented on harsh environment and sever conditions for industrial applications

  - Single point optical fiber probe techniques to measurement gas and liquid velocities and holdup in monolith and structured beds, volume bed expansion in a mixture of solvent and supercritical CO_2 for the development of environmentally benign processes, and the phase transition from subcritical to supercritical state
  - 4-point optical fiber probe techniques (quartz and plastic) and their manufacturing facilities to measure distribution of bubble dynamics in gas-liquid and gas-liquid-solid systems (bubble size, bubble velocity in all direction, specific interfacial area, local gas holdup, bubble frequency, bubble direction distribution)
  - Four 2-point optical fiber probes for 4 sizes of solid particles ranges for two phase gas-solid systems to measure simultaneously solids and gas holdups and velocities and their time series fluctuations that are complemented with two sophisticated and simple calibration devices
  - 2-point optical fiber probe and new data processing to measure in two phase flow packed beds local liquid and gas velocities, liquid and gas saturations, and their time series fluctuations
  - Novel and advanced heat transfer probe to measure local heat flux and heat transfer coefficients from surface to fluid that mimic the heat exchanging surfaces, tubes, internals and pebbles
  - Mass transfer optical probe to measure local mass transfer coefficients
  - Tracer technique to measure overall mass transfer coefficients using tracer signal of partially dissolved gas
  - A methodology that combines 4-point optical fiber probe for the specific interfacial area and bubble dynamics and local and overall mass transfer coefficients measurements to measure the mass transfer coefficients of gases that are hard to measure in systems of interest
  - Gas phase tracer dynamic technique to measure residence time distribution (RTD), dispersion and mixing intensity of the gas phase
  - Liquid phase tracer dynamic technique to measure residence time distribution (RTD), dispersion and mixing intensity of the liquid phase
  - Virtual particles tracking obtained from the trajectory of the radioactive particle tracking (RPT) techniques to measure solid phase residence time distribution (RTD), dispersion and mixing intensity of the solid phase
  - Hot wire anemometry for gas velocity measurements
  - Electro-chemical method for liquid-solid mass transfer coefficient and liquid velocity Measurements
  - Combined bore-scope and optical probes to film and characterize bubbles dynamics in stirred tank reactors
  - Pressure transducers and local pressure probe

❖***II. Advanced Computing Techniques, Modeling and Data Processing Developed and Implemented***

- Computational fluid dynamics (CFD) for various multiphase systems, Discrete Element Method (DEM) for solids dynamics and combination of CFD-DEM for flowing fluids and solids dynamics
- Mechanistic and non-ideal/non-linear reactor scale models for various multiphase reactors and flow systems
- Chaotic and statistical analyses to time series signals obtained from various sophisticated measurement techniques which enable understanding the phase's behaviors and what is going on inside the opaque flow systems
- Artificial neural network of machine learning and mechanistic correlations that facilitate new methodologies for design and scale up of multiphase reactors and flow systems

❖***III. State-of-the art Separate Effects, Laboratory and Pilot Plans Scale Experimental Set-ups***

- High pressure and high temperature of 300 ml Parr batch, semi batch and continuous mixed reactor equipped with and without a basket of catalyst to measure kinetics and to test catalysts
- High pressure and high temperature 1-inch, 3/4-inch, 3/8-inch, 1/2-inch, and 1/4-inch packed bed reactors with and without thermocouple wells and temperature measurements that can be packed with catalyst and/or with catalysts and diluted inert fines with all safety precautions and mode of down-flow, up-flow and counter-current flow of gas and liquid phases to measure reactor performance of gas-solid and gas-liquid-solid systems, to test catalyst, to validate models and scale-up/scale-down and to develop processes
- Two 1-liter autoclave high temperature and pressure batch and continuous flow mixed reactors with and without catalyst baskets to measure kinetics, test catalysts and to develop processes
- Mini-autoclave (25 ml) reactor system and mini-tubular reactors
- 300 ml autoclave reactor equipped with IR measurement techniques
- Unique separate effect experiment for continuous circulation of pebbles for representative scaled-down set-up for pebble bed 4th generation nuclear reactor cooled by Helium equipped with novel integrated of advanced thermal hydraulic measurement techniques
- Unique separate effect experiment for natural convection of scaled-down prismatic block 4th generation nuclear reactor equipped with novel integration of sophisticated techniques of hot wire anemometry, wall flush mounted heat transfer probe, thermocouple and gas tracer dynamics
- 6-inch photobioreactors and bioreactors of air-lift and bubble columns
- Unique separate effect experiment of 1-cm tubular photobioreactor to measure dynamic kinetics and growth rate model of microalgae and cyanobacteria
- 6-inch and 18-inch diameter bubble and slurry bubble columns and gas-liquid-solid fluidized beds that are equipped with and without internals
- Industrial 24-inch diameter bubble and slurry bubble columns and gas-liquid-solid fluidized bed that are equipped with and without industrial heat exchanging internals
- 6-inch and 18-inch diameter gas-solid fluidized beds that are equipped with and without internals
- 6-inch and 12-inch diameter two phase flow packed beds (down flow and up flow) with various distributors and plenums designs
- 3-inch and 6-inch gas-solid spouted beds with and without pressure and probe ports
- Two 12-inch diameter moving beds with
- 2-inch two phase flow monolith reactor equipped with various distributors and optical fiber probes arrays inside the channels
- High temperature and high pressure pilot plant for various multiphase reactors that is equipped with various ranges of mass flow-meters for gas and liquid phases and for temperature and pressure monitoring
- 6-inch high pressure (up to 200 psi) and high gas velocity (up to 60 cm/s at high pressure) bubble/slurry bubble column reactor without with quarts windows and ports for probe and pressure measurements equipped with and without heat exchanging internals
- 6-inch gas-solid riser facility of 26 ft height that can be used as gas-solid fluidized bed and circulating bed with 3-inch down-comer
- Pilot plant scale column (18 inch in diameter and 13 ft. height) that can be operated as continuous, semi-continuous and batch gas-liquid system, slurry bed, gas-liquid-solid fluidized bed (ebullated

bed), liquid-solid fluidized bed and gas-solid fluidized bed which is equipped with dynamic differential pressure transducers and conductivity probe tracer technique along its height. The unit can be as well utilized as a bioreactor for bioprocessing and biological waste treatment studies

- 8-inch diameter trayed bubble column facility of 9 ft. the height that can be as well operated as a bioreactor
- 12-inch and 2-inch structured packed bed reactors that can handle different type of structured beds (i.e., monolith, static mixer configuration, etc.) in co-current and countercurrent modes of operation. They can be as well operated as bioreactors for various bioprocessing.
- 1-inch and 2-inch cold flow high pressure two phase flow packed bed reactors
- High pressure 6-inch two phase flow packed bed reactors for hydrodynamics and transports studies which can measure simultaneously the exit flux distribution of liquid and gas phases
- Two pilot plant scale anaerobic digesters of 96 Liter in capacity (18 inch diameter) set-ups; one for performance study and another for measurement techniques and probes
- A number of various configurations and modes of mixing (mechanical agitation, gas circulation, slurry circulation, liquid circulation, no mixing) of laboratory scale anaerobic digesters (~4-liter) for diary waste treatment and biogas production with all the related measurement and analytical equipment
- Bioenergy production (bioethanol) and bioreactor system facilities
- High pressure and high temperature 2 inch diameter pilot plant scale packed bed reactors (structured and non-structured beds) that are enclosed in a steel box and monitored via video camera which has been approved for safe operation

TEACHING

I. Courses Taught and Developed

18. Process Separations, required for undergraduate students (Developed)
17. Intermediate Reactor Design (Developed)
16. Catalysis and Kinetics (Developed)
15. Chemical Process Flow sheeting (Developed)
14. Numerical Computing in Chemical and Biochemical Engineering (Developed)
13. Intermediate Numerical Computing in Chemical and Biochemical Engineering (Developed)
12. Modeling and Computing in Chemical and Biological Engineering (Developed)
11. Introduction to computing and computer applications (Developed)
10. Engineering Ethics, required for undergraduate students
9. Fluid Flow/Mechanics, required for undergraduate students
8. Radiochemistry and Nuclear Forensic (Developed and Taught Selected Lectures)
7. Unit Operations Laboratory (I) (Restructured and Developed New Experiments)
6. Unit Operations Laboratory (II) (Restructured and Developed New Experiments including internet based operated experiments and implementation of Emerson industrial Delta V Process Management and control system)
5. Incorporated Research Facilities into Undergraduate Chemical Engineering Laboratory Courses
4. Process Engineering Components (Developed)
3. Capstone Design with Industrial Mentoring and Projects (Solutia, Monsanto-Enviro Chem, ConocoPhillips Refinery, Mallinckrodt, EHV-Weidmann Industries, SIU bioethanol pilot plant) (Developed)
2. Bioprocess Engineering: I-Fundamentals and Applications (Developed)
1. Bio-Catalysis (Developed and Taught Selected Lectures)

II. Undergraduate Experiments Developed

8. Spearheaded and supervised the development of multidisciplinary mass flowmeters and pressure and temperature measurements, instrumentation and process control integrated with industrial Delta V (process control management system) donated by Emerson and its subsidiaries (Experitec and Rosemount) (2016-present)
7. Supervised the development of two counter-current packed beds absorbers to clean gas stream by physical and chemical absorption donated by ConocoPhillips and Phillips66 which is integrated

with Emerson Delta V process control system with the help of Rosemount donation of instrumentation and mass flowmeters (2012-present)

6. Incorporated my research facilities into undergraduate chemical engineering laboratory courses (2005-present)
5. Supervised the development of the energy and heat exchanging experiment to be operated via the internet (2004)
4. Developed and implemented an innovative interactive learning approach for the open-ended bioenergy based experiment which has been introduced in 2004 presented in 229th ACS annual meeting (2005) – Green chemical education (2004)
3. Supervised the development of web-based operated experiment for undergraduates. The the experiment can be run and the data can be collected, downloaded and processed via the internet (2003)
2. Supervised undergraduate students for development of 1 liter and 37 liter bioreactor setup for Bio-energy based open-ended experiment for bioethanol production (2002)
1. Supervised the development of thermal polymer coating using gas-solid fluidization (2002)

III. Short Courses, Workshops and Lectures developed and Offered to Industry, Research Centers and Academia

6. Multiphase Reactors Engineering and Technology (Developed)

Selected Topics:

- Introduction to multiphase reaction and reactors, Multiphase reaction engineering concepts, Laboratory reactors for kinetics development and catalyst testing, Laboratory reactors' experimental data interpretation and analysis, Characterizing multiphase reactors for new processes development
- Advanced measurement techniques for hydrodynamics and transports of multiphase reactors and flow systems, CFD of multiphase reactors and validation, Reactor scale modeling, Hybrid modeling approach, Scale-up of multiphase reactors, Residence time distribution (RTD) concepts and how to be used for reactor modeling and performance prediction, How cold flow studies and advanced techniques and computing could enable commercialization: selected examples including renewable energy and products
- Bubble and slurry bubble column reactors, Gas-liquid-solid fluidized bed (Ebullated bed) reactors, Liquid-solid fluidized bed and circulating fluidized bed reactors, Two-phase flow packed beds - Trickle bed reactors, Two-phase flow packed beds - Upflow packed bubble bed reactors, Gas-solid fluidized bed reactors, Gas-solid circulating fluidize bed (CFB) [Gas-solid riser and downer] reactors, Gas-lift reactors, Moving bed reactors, Mechanically Agitated Reactors, Gas-solid spouted beds, Introduction to Micro-reactors
- Bioreactors - Aerobic and anaerobic bioreactions
- Resent advances on nanofluids
- Pebble bed nuclear Reactors, Prismatic block nuclear reactors,
- Water and wastewater treatment

5. Quality Assurance (QA) and ABET Accreditation of Engineering Education (Developed)

Selected Topics:

a. Best practices for developing, reviewing and modifying curricula and courses syllabi, Concept

of international accreditation versus national accreditation, Process and approaches of continuing improvement, Benchmarking, Program Educational Objectives (PEOs) and Program Outcomes (POs), Quality assurance (QA) assessment, evaluation and continuous improvement, Relevant QA system for Iraq with international prospective, Institutional framework: current status and future needs, Overview quality assurance as the essential step of the roadmap toward accreditation, Means for curricula improvement and modernization, Teaching methods and educational technologies, Ways for establishing effective collaborations with foreign universities, Undergraduate teaching laboratories and research laboratories, Laboratory safety and security, Mission, program educational objectives (POEs) and student (program) outcomes (SOs) development, Self-study report preparation

b. Process for applying and obtaining ABET accreditation, ABET self-study report, Program educational objectives and student outcomes for ABET, Assessment, evaluation, rubric and continuous improvement, ABET site visit, Case studies and practical examples

4. Imaging and Visualization using Nuclear Technology for multiphase flow and reactors research and for industrial processes (Developed)

Selected Topics:

a. Introduction to radioisotopes based measurement techniques, Importance of imaging and visualization of multiphase flow and reactors, Applications of nuclear technology for industrial processes imaging and visualization
b. Concept of tomography, Gamma ray tomography image reconstruction algorithms – Expectation - Maximization (EM), Alternating - Minimization (AM) and Filtered Back-Projection (FBP), Gamma ray computed tomography (CT) and Dual source/energy, gamma ray computed tomography (DSCT), Gamma ray densitometry (GRD), Radioactive particle tracking (RPT), radioactive tracer and residence time distribution (RTD) techniques – Set-up and components, data acquisition, calibration, operation, reconstruction and data processing, Wavelet-based filtering of radioactive particle tracking (RPT) data, RPT as a radioactive tracer technique, Development of multiple radioactive particles tracking (MRPT) Technique, Insitu RPT and MRPT calibrations and hybrid calibration collimated detectors devices with RPT/MRPT techniques, Implementation of cross-correlation method in flow rate and velocity of phases measurements using various advanced measurement techniques
c. Description and dose calculation, Concept of shielding and calculations, Basic concepts for radiation protection, safety, procedures and protocols

3. Chemical and Biological Safety and Security (CBSS) Laboratories (Developed)

Selected Topics:

a. Lacking for laboratory chemical and biological security and safety practices in Iraqi universities, Lessons learned and effective implementation of chemical and biological security and safety
b. Overview of laboratory chemical safety and Security practices, Overview of the chemical weapons convention, Chemical/biological weapons, threats, and obligations, University procurement, supply chain, and transportation security, Chemical and biological inventory management, Institutional safety and security management, Overview of chemical and biological safety and security equipment, Personnel reliability and human factors, Risk assessment, Considerations for emergency plans and procedures, Introduction to incident management and response, Examples and lessons learned: Effective implementation of chemical and biological Security, Developing basic chemical and biological Security action plans, Emergency review, Knowing the hazards, Compliance of laboratory safety, Overview of laboratory safety and security - Example of laboratory practices, Slips, trips, and falls, Hazard communication
c. Best practices for implementing chemical safety and security in Iraqi universities and lessons learned, Examples of teaching and research laboratories safety and security, Overview of chemical and biological safety and security equipment

2. Research Methodology

Selected Topics:

a. Research quality and assessment, Research presentation and progress reporting, Statistical analysis, Defining research projects, Writing proposals and grants applications, Multidisciplinary research team building

1. Exploring Waste-to-Energy Technologies

Selected Topics:

a. Anaerobic Digestion of Animal and Farm Wastes for Bio-Energy Production and Clean Environment

CONFERENCES, SESSIONS CHAIRED AND COMMITTEE MEMBERS

I. Founded, Co-Founded, Chaired and Co-Chaired National and International Conferences

Selected examples (2006-Now)

2019 International Symposium on Advances in Hydroprocessing of Oil fractions (ISAHOF), Mazatlán, Mexico June 9-12, 2019 – Co-Chaired

2018 International Mexican Congress on Chemical Reaction Engineering (IMCCRE), Mazatlán, Mexico, June 10-14, 2018 – Co-Chaired

2017 International Symposium on Advances in Hydroprocessing of Oil fractions (ISAHOF), Mexico City, Mexico, June 4-7, 2017 – Co-Chaired

2017 International Conference on Environmental Impacts of the Oil and Gas Industries, (EIOGI 2017), Koya, Kurdistan region, Iraq, April 17-19, 2017 – Co-Chaired

2016 International Mexican Congress on Chemical Reaction Engineering (IMCCRE), Querétaro, Mexico, June 5-9, 2016 – Co-Chaired

2016 8th World Congress on Industrial Process Tomography (WCIPT8) in Brazil, September26-29, 2016 – Co-Chaired

2010 Catalysis for Renewable Sources: Fuels, Energy, Chemicals", Tsars Village, St. Petersburg, Russia, June 28 – July 2, 2010 - Co-Founded and Co-Chaired

2009 GLS9 (Gas-liquid-Solid reactors engineering) conference as part of the 8th World Congress on Chemical Engineering (WCCE8), Montreal, Canada, August 23-28, 2009 – Chaired and Organized

2009 Bioenergy II - Fuels and Chemicals from Renewable Resources, March 8-13, 2009 – Brazil, Rio de Janeiro organized by Engineering Conferences International (ECI), New Your, NY, USA – Founded and Co-Chaired

2006 Bioenergy I: from concept to commercial production", Tomar, Portugal, March 5-10, 2006, organized by Engineering Conferences International (ECI), New Your, NY, USA – Founded and Co-Chaired

II. Founded, and Co-Founded, Chaired and Co-Chaired Technical Sessions in National and International Conferences

Selected examples (1995-Now)

2019 International Symposium on Advances in Hydroprocessing of Oil fractions (ISAHOF 2019), Mazatlán, Mexico, Mexico, June 9-12, 2019

2018 International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2018), Mazatlán, México, June10-14, 2018

2017 CAMURE-10 (the 10th International Symposium on Catalysis in Multiphase Reactors) and ISMR-9 (the 9th International Symposium on Multifunctional Reactors), Qingdao, China, July 7-10, 2017

2017 International Symposium on Advances in Hydroprocessing of Oil fractions (ISAHOF 2017), Mexico City, Mexico, June 4-7, 2017

2017 International Conference on Applications of Radiation Science and Technology, IAEA, Vienna, Austria, April, 24-28, 2017

2016 AIChE Annual Meeting in Honor of Dr. R. Lange (TU Dresden), November 14, 2016, San Francesco, California – Founded and chaired

2016 International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2016), June 5-9, 2016, Queretaro, Mexico

2016 6th TRC-TAKREER, February, 2016, Abu Dhabi, UAE

2012 ISPT, March, 2012, Cape Town, South Africa

2009 Bioenergy II, 2009, Brazil – Founded and chaired

2007 GLS 8, December 16-19, 2007, New Delhi, India

2007 WCIPT5, September, 2007, Bergen, Norway

2007 IBCAST07, January 8-12, 2007, Pakistan

2006 APCChE06-11th Asian pacific confederation of chemical engineering, Kuala Lumpur, Malaysia, August 2006

2005 CHEMCON-5, New Delhi, India, December, 2005

2005 4th world congress of industrial process tomography, Aziu, Japan (2005)
2004 AIChE annual meeting, Recent Advances on Bioreactors – Founded and chaired
2004 Multiphase Reaction Engineering in Honor of Professor Mike Dudukovic, 2004 AIChE annual meeting, Austin, Texas – Founded and chaired
2004 multiphase reactors in 2004 AIChE annual meeting, Austin, Texas
2004 ISAHOF, Oaxaca, Mexico, April 2004
2003 AIChE annual meeting, Recent Advances on Bioreactors – Founded and chaired
2003 Flow visualization and tomography in reaction engineering I&II and on advances on multiphase reactors, 2003 AIChE annual meeting, San Francisco, CA – Founded and chaired
2003 3rd world congress of industrial process tomography, Banff Canada (2003)
2002 New developments in multiphase reactors, 2002 AIChE annual meeting, Indianapolis, Indiana
2002 AIChE annual meeting, Recent Advances on Bioreactors – Founded and chaired
2002 Process Improvement in Manufacturing, 2002 Spring AIChE Meeting, New Orleans, LA, (March 10-14, 2002)
2001 AIChE annual meeting, Recent Advances on Bioreactors – Founded and chaired
2000 Multiphase Catalytic Reactors Engineering, 16th Canadian Symposium on Catalysis, Banff, Canada, (May 23-26, 2000)
2000 AIChE annual meeting, Recent Advances on Bioreactors – Founded and chaired
2000 Radiometric Tomography, at the 2000 SPIE – Process Imaging for Automatic Control, Boston, MA, (November 5-8, 2000)
2000 Organized a workshop on Fluent CFD code at the Chemical Engineering Department, (October 13, 2000)
1999 Computational Fluid Dynamics and Mixing, 17th Biennial North American Mixing Conference, Banff, Canada, (August 15-20, 1999)
1998 Fluidized Bed Reactors – ISCRE 15 (International Symposium on Chemical Reaction Engineering), Newport, CA, (September 13-16, 1998)
1995 Multiphase reactors – 1995 AIChE annual meeting, Miami Beach, Florida, (November 12-17, 1995)

III. Selected Professional Committee Members

2019-now Member of International Society for Industrial Process Tomography (ISIPT)
2018-now Member of the Advisory Committee of Al-Khwarizmi College of Engineering, University of Baghdad – Iraq
2018 Member of the consultants' committee meeting to define international project on cross correlation of radioactive tracer in industrial applications for International Atomic Energy Agency (IAEA), June 25-29, Krakow, Poland
2017-now Member of the International Society for Tracer and Radiation Applications (ISTRA)
2015-now Member of Arab Academy of Scientist – Jordan
2017 Member of the Scientific/Technical Committee of CAMURE-10 (the 10th International Symposium on Catalysis in Multiphase Reactors) and ISMR-9 (the 9th International Symposium on Multifunctional Reactors), Qingdao, China, July 7-10, 2017
2017 Member of the Scientific/Technical Committee of the International Conference on Applications of Radiation Science and Technology (ICARST 2017), 24-28 April 2017
2017 Member of the Scientific/Technical Committee of SYMPHOS (2017) (International Symposium on Innovation and Technology in the Phosphate Industry)
2016 Member of the scientific committee of Industrial Process Tomography Conferences – 6th International Symposium on Process Tomography, Cape Town, South Africa, March 26-28, 2012
2015 Member of the Scientific/Technical Committee of SYMPHOS (2015) (International Symposium on Innovation and Technology in the Phosphate Industry)
2010 Chaired consultants' committee meeting to define international project on measuring industrial multiphase flow systems using radioisotopes for International Atomic Energy Agency (IAEA), October, Vienna, Austria

2008	Chaired consultants' committee meeting to define international project on visualizing industrial multiphase flow systems using radioisotopes for International Atomic Energy Agency (IAEA), October, Vienna, Austria
2007	Chaired consultants' committee meeting to define international project of radioactive particle tracking techniques for International Atomic Energy Agency (IAEA), October 22-25, Vienna, Austria
2006-now	Member of Network Iraqi Scientists Abroad (NISA)
2006-now	Member of the international board of gas-liquid-solids (GLS) reactors engineering, USA
2005	Member of the technical committee of the 3rd and 4th world congress of industrial process tomography – Aziu, Japan (2005)
2003	Member of the technical committee of the 3rd and 4th world congress of industrial process tomography – Banff Canada (2003)
2002-2007	Member of the advisory committee of the International Bhurban conference on applied sciences and technology (IBCAST), Pakistan
2000	Program committee member for the International Conference on "Process Imaging for Automatic Control", SPIE (The International Society for Optical Engineering" Boston, MA, (November 5-8, 2000)

RESEARCH SUPERVISION

PhD and MS Theses and Degrees at Missouri S&T and Washington University

Missouri S&T (Since 2009)

Completed PhD Theses (21 as Advisor and 1 as Co-Advising)

23. Binbin Qi, May 2021, Investigation of packed bed and moving bed reactors with benchmarking using advanced measurement and computational techniques
22. Humayun Shariff, January 2019, Experimental and modeling studies using packed bed reactors: liquid phase ethylene production by hydrogenation of acetylene
21. Mohammed Jaber Al-Ani, August 2019, Hydrodynamics of trickle bed reactors (TBRs) packed with industrial catalyst using advanced measurement techniques
20. Hayder Alnaseri, May 2019, The effects of low aspect ratio and heat exchanging internals on the bubble properties and flow regime in a pilot-plant bubble/slurry bubble column for Fischer-Tropsch synthesis
19. Laith Sabri, December 2018, Characterization of split Internal-loop photobioreactor for culturing microalgae via non-invasive gamma-ray techniques: Hydrodynamics and Modeling
18. Nasser Zouli, December 2018, Enhancement of heat transfer coefficient using nanofluids for thermal multi-stage flash desalination (MSF)
17. Vineet Alexander, May 2018, Hydrodynamics related performance evaluation of upflow moving bed hydrotreater (MBR) reactor using developed experimental methods and CFD simulations
16. Thaar Aljuwaya, May 2018, Investigation of the hydrodynamics and scale-up of advanced TRISO nuclear fuel manufacturing using sophisticated measurement techniques (Nuclear Engr.)
15. Abbas J. Sultan, May 2018, Hydrodynamics study of the bubble columns with intense vertical heat-exchanging internals using gamma-ray computed tomography and radioactive particle tracking techniques, Department of Chemical Engineering
14. Mahmood Taha, December 2017, experimental investigations of natural circulation in a separate-and-mixed effects test facility mimicking prismatic modular reactor (PMR) core
13. Ibrahim Ahmed Said, December 2017, experimental study of natural convection heat transfer and gaseous dynamics from dual-channel circulation loop
12. Haider Taofeeq, December 2017, Impact of vertical internals on the hydrodynamics and heat transfer coefficient in a gas-solid fluidized bed
11. Abdulrahman Fitri, May 2017, Investigation local velocities and phase holdups and flow regimes and maldistribution identification in a trickle bed reactor
10. Aastha Ojha, December 2016, Advancing microalgae culturing via bubble dynamics, mass transfer and dynamic growth investigations

9. Abdelsalam Efhaima, May 2016, Scale-up investigation and hydrodynamics study of gas-solid fluidized bed reactor using advanced noninvasive measurement techniques
8. Neven Y. Ali, May 2016, Evaluating of scale-up methodologies of gas-solid spouted beds for coating TRISO nuclear fuel particles using advanced measurement techniques (Nuclear Engr.)
7. Khairul Anwar Mohd Salleh – Co-Advising with Y. Lee, May 2014, Local liquid velocity measurement of trickle bed reactor using digital industrial X-ray radiography (Nuclear Engr.)
6. Rahman Abdulmohsin, May 2013, Gas dynamics and heat transfer in a packed pebble-bed reactor for the 4th generation nuclear energy
5. Vaibhav Khana, December 2013, Experimental and computational investigation of flow of pebbles in a pebble bed nuclear reactor
4. Shreekanta Aradhya, May 2013, Scale up and hydrodynamics Study of Gas-Solid Spouted Beds, Chemical and Biochemical Engineering Department, In Industry-USA
3. Moses Kagumba, May 2013, Heat transfer and bubble dynamics in bubble and slurry bubble columns with internals for Fischer-Tropsch synthesis of clean alternative fuels and chemicals
2. Mohamed Al Mesfer, May 2013, Effects of Dense Heat Exchanging internals on the hydrodynamics of bubble column reactors using non-invasive measurement techniques
1. Faraj Zaid, May 2013, Gas-Solid Fluidized Bed Reactors: Scale-Up, Flow Regimes Identification and Hydrodynamics

Current PhD Students (7)

8. Zeyad Zeitoun, 7. Jihane Mendil, 6. Youssef Yatimi, 5. Sebastian Uribe, 4. Omar J. Farid, 3. Qusay Al-Obaidi, 2. Muhna Alshammari (Nuclear Engr.), 1. Saud Aldawood (Nuclear Engr.)

Completed MS Theses (7)

7. Choji Bitrus Daches, December 2019, Performance investigation of surface modified ceramic microfiltration membranes and the effects of ionic strength
6. Ali Toukan, May 2016, Hydrodynamics of a co-current gas liquid up flow in a moving packed bed reactor with a porous catalyst
5. Ahmed Jasim, May 2016, The impact of heat exchanging internals on hydrodynamics of bubble column reactor, Chemical and Biochemical Engineering Department
4. Fadha Ahmed, December 2014, Experimental investigation of the pebble bed structure by using gamma ray tomography (Nuclear Engr.)
3. Vivek Rao, August 2012, academic advisor
2. Christine Meitzner, May 2011, Hydrodynamics of Monolithic Reactor, Technical University of Dresden, Germany
1. Humayun Shariff, August 2010, as academic advisor

Completed MS Students – Non-Thesis (17)

17. Omar J. Farid (May 2020), 16. Qusay Al-Obaidi (December 2017), 15. Neila Pederneira (August 2017-19), 14. Hayder Alnaseri (August 2016), 13. Srishti Shrivastava (May 2016), 12. Ibrahim Said Abdullah (December 2015), 11. Mohammed Al-Ani (December 2015), 10. Nasser Zouli (December 2015), 9. Abdelsalam Efhaima (August 2015), 8. Haider Taofeeq (August 2015), 7. Abbas Sultan (May 2015), 6. Laith Sabri (May 2015), 5. Aastha Ojha (May 2014), 4. Vaibhav Khane (May 2013), 3. Gaurav Vedpathak (May 2012), 2. Rasika Nimkar (December 2012), 1. Rania Shahada (December 2012)

Washington University - Advisor (1994-2008)

Completed Doctoral Theses (14)

14. Mohammed Ezat Awad, 2012, Hydrodynamics, mixing, and mass transfer in bubble columns with internals (since I left the university I was listed a co-chair on the thesis)
13. Ahmed Youssef, 2010, Fluid dynamics and scale-up of bubble columns with internals (since I left the university I was listed a co-chair on the thesis)
12. Bia Henriques, 2009, Enzymatic enhancement of water removal in the dry grind corn to ethanol process (since I left the university I was listed a co-chair on the thesis)
11. Rajneesh Varma, 2008, Characterization of anaerobic bioreactors for bioenergy generation using a novel tomography technique

10. Wu Chengtian, 2007, Heat transfer and bubble dynamics in slurry bubble columns
9. Lu Han, 2007, Hydrodynamics, back-mixing, and mass transfer in a slurry bubble column reactor for Fischer-Tropsch alternative fuels
8. Ashfaq Shaikh, 2006**,** Bubble and slurry bubble column reactors: mixing, flow regime transition and scale up
7. Mehul Vesvikar, 2006, Understanding the hydrodynamics and performance of anaerobic digesters
6. Shaibal Roy, 2005, Phase distribution and performance studies of gas-liquid monolith reactor
5. Huping Luo, 2005, Analyzing and modeling of airlift photobioreactors for microalgae and cyanobacteria cultures
4. Satish Bhusarapu, 2005, Solids flow mapping in gas-solid risers
3. Jing Guo, 2005, Catalytic wet oxidation over pillared clay catalyst in packed-bed reactors: Experiments and Modeling
2. Novice Rados, 2003, Slurry bubble column hydrodynamics
1. Yi Jiang, 2000, Flow distribution and its impact on performance of packed-bed reactors

Completed MS Theses (4)

4. Rebecca Hofmann, 2005, Effect of modeling on the performance of anaerobic digesters
3. Eusebio Palmisano, 2004, Wetting efficiency of complex shape catalyst in trickle bed reactors,
2. Javier Alvare, 2002, Gas holdup and liquid phase mixing in trayed bubble column reactors
1. Stuart Wesley Highfill, 1998, Liquid-solid mass transfer coefficient in high pressure trickle-bed reactor

Washington University – Co-Advisor (1994-2008)

Completed Doctoral Theses (7)

7. Zeljko Kuzeljevic, 2010, Hydrodynamics of trickle bed reactors: measurements and modeling
6. Sean Mueller, 2009, Optical measurements in gas-liquid stirred tank
5. Junli Xue, 2004, Bubble velocity, size and interfacial area measurements in bubble columns
4. Boon-Cheng Ong, 2003, Experimental investigation of bubble column hydrodynamics effect of elevated pressure and superficial gas velocity
3. Puneet Gupta, 2001, Churn-turbulent bubble columns- experiments and modeling
2. Shantanu Roy, 2000, Quantification of two-phase flow in liquid-solid risers
1. Mohan Khadilkar, 1998, Performance studies of Trickle bed reactor

International Graduate Students (PhD/MS) Supervised as Co-Adviser in my Lab (16)

16. Jihane Mendil (PhD, UM6P, Morocco) (2020), 15. Deepali Chugh (PhD, IIT Delhi, India) (2016), 14. Christine Meitzner (MS, Technical University of Dresden, Germany) (2011), 13. Pablo V. Salvador (PhD, University of Sao Paulo (USP), Brazil) (2008), 12. Rahman AbdulMohsen (PhD, University of Technology, Iraq) (2008), 11. Tobias Bauer (PhD, Technical University of Dresden, Germany) (2007), 10. Ertugrul Ercok (PhD, Ataturk University, Turkey) (2007), 9. Werner van der Merwe (PhD, University of Pretoria, South Africa), 8. M. Arif (MS, Pakistan Institute of Engineering and Applied Sciences (PIEAS), Pakistan) (2007), 7. Muhammed Akbar (PhD, Curtin University, Australia) (2006), 6. R. Guettel (MS, Technical University of Dresden, Germany) (2005), 5. Markus Schubert, (MS, Technical University of Dresden, Germany) (2005), 4. Elisa Rodrigues (PhD, Almeria University, Spain) (2004), 3. A. Vold, (MS, Technical University of Dresden, Germany) (2004), 2. Tobias Bauer, (MS, Technical University of Dresden, Germany) (2003), 1. Jana Huettmann (Diploma, Martin-Luther University, Germany) (1997)

External Examiner for International Students' PhD/MS Theses (15)

15. El-Mahdi Lakhdissi, (PhD) Ecole polytechnique de Montreal, Canada, July 2020, 14. Lipika Kalo, (PhD) IIT – Guwahati, India, April 2019, 13. Majid Rasouli, (PhD) Ecole polytechnique de Montreal, Canada, 2015, 12. Amin Esmaeili Khalil Saraei, (PhD) Ecole polytechnique de Montreal, Canada, April, 2014, 11. Victer Veldman, (MS) University of Pretoria, South Africa, March 14, 2013, 10. Moayed Youssef Al-Bassam, (PhD) Alexandria University, Egypt, October 2011, 9. Nabeel S. M. Abo-Ghander, (PhD), The University of British Columbia, Canada, November 2010, 8. Mohamed, H. M. Mowena, (PhD) Alexandria University, Egypt, October 2010, 7. Fabiana Mederos, (PhD), Institute Mexico de Petroleum (IMP), Mexico, June 17-18, 2010, 6. Kamal Uddin Ahmed, (PhD) Department of Civil Engineering, IIT Guwahati- India, June 2010, 5. Moustapha Ibrahim Salim Mansour (PhD), Alexandria

University, Egypt, 2008, 4. Ahmed Saad Shehata, (PhD) Alexandria University, Egypt, 2007, 3. A. J. van Houwelingen, (MS) University of Pretoria, South Africa, 2006, 2. Werner van der Merwe, (MS), University of Pretoria, South Africa, 2004, 1. T. Renganathan, (PhD), IIT Madras, India, 2002

Research Associates, Postdocs, Visitors and Faculty on Sabbatical

Missouri S&T (26)

27. Jihane Mendil (October 2020-July 2021), 26. Dr. Alexandre Velo (March-October 2020, Brazil), 25. Dr. Arshed Kulab (Jan-May 2020, Iraq), 24. Prof. Yousef Alanezi (October 2018- September 2019, Kuwait), 23. Prof. Faris Mohammed (June 2018- May 2019, Iraq), 22. Dr. Premkumar (January 2017-Sep 2018, India), 21. Dr. Neven Ali (June 2016 – 2017, USA), 20. Jianbin Shao (2014-2017, China), 19. Prof. Shantanu Roy (Summer 2016, India), 18. Deepali Chugh (Spring 2016, India), 17. Prof. Jawad Al-Assal (2016-2017, Iraq), 16. Prof. Sawsan AlBasri (2015-2016, Iraq), 15. Dr. Hamza Al-Bazaz (one Month in 2014 and in 2015, Kuwait), 14. Dr. Yuan Zhou (February 2014 – 2015, China), 13.Ghassan Al-Doori (February 2013 – July 2013), 12. Shaker Ebrahim (Three months in 2013, 2014 and in 2017, Kuwait), 11. Prof. Amer Daham (April–December 2012, Iraq), 10. Prof. Saba Gheni (Spring 2016, April-December 2012, Iraq), 9. Prof. Yasser Abdulaziz (2012-2013, Iraq), 8. Dr. Stoyan Nedeltchev (February 2010 - February 2012, Bulgaria), 7. Rahman Abdulmohsin (2009/2010, Iraq), 6. Dr. Fadha Ahmed (2010, USA), 5. Prof. Xingying Lan (2010-2011, China), 4. Prof. Ghanim Maqbool alwan (2010-2011, Iraq), 3. Prof. Ahlam J. AbdulGhani (2011, Iraq); 2. Hayder Hassan Taha (2011, Iraq); 1. Yassif M. Ali (2011, Iraq)

Washington University (23)

23. Arnaud Denecheau (2007-2009, France), 22. Dr. Gengzhi Yu (2007-2008, China), 21. Dr. Fadha Ahmed (2005-2008, Iraq), 20. Dr. Ashraf Shahata (2006-2007, Egypt), 19. Dr. Keshav Ruthiya (2005-2006, India), 18. P-Y. Lanfrey (2005-2006, France), 17. Prof. Prakash Anand (2006, Canada), 16. Dr. F. Doering (2003-2004, USA), 15. Dr. K. Karim (2001-2004, India), 14. N. Dromard (2001-2002, France), 13. E. Erkoc (2002-2003, Turkey), 12. K. Koop (2002-2003, The Netherlands), 11. Delsart Olivier (2002-2003, France), 10. M. Capitaine (2003-2006, France), 9. Dr. A. Kemoun (1997-2001, Algeria), 8. Dr. B. Chen (2000-2001, China), 7. Dr. M. Rafique (2000 – 2003, Pakistan), 6. Dr. P. Spicka (2001-2002, Slovakia), 5. Prof. J. M. Fernandez (2002, Spain), 4. Prof. Pascal Fongrland (2000-2002, France), 3. Jacques F. Nicole (2000-2001, Switzerland), 2. Prof. D. Tsamatsoulis (2000, Greece), 1. Prof. Y. Wu (1994, 1999-2000, China)

Undergraduate Students Supervised

Missouri S&T: **68**
Washington University: **46**
High School Students - Washington University (NSF STARS Summer Program): **12**

Sponsored Fellowships under My Supervision

Missouri S&T (20)

20. USAID – Egypt, Dr. Nora Yehia Elsayed Salem, 4 months as part of US-Egypt Higher Education Initiative to work on multiphase reactors
19. Kuwait Higher Education, Prof. Yousef Alanezi to work on water and wastewater treatment using membrane (October 2018- September 2019)
18. University of Technology, Iraq, Prof. Faris Mohammed to work on wastewater treatment using emulsion liquid membrane (June 2018- May 2019, Iraq)
17. Institute of International Education (IIE), Iraqi Scholar Rescue Fund program (ISRF), Dr. Nadia A. Gheni to work on bioseparation (December 2015- December 2016)
16. University of Kirkuk, Iraq, Prof. Jawad Al-Assal to work on flow in porous media (2016/2017)
15. IIT Delhi, India, Deepali Chugh, to complete her PhD research on hydrodynamics of two phase flow in a monolith reactor, (6 months in 2016)
14. Kuwait Institute for Scientific Research (KISR), Kuwait, Shaker Ebrahim to work process imaging using gamma ray densitometry (Three months in 2017)
13. University of Baghdad, Iraq, Prof. Sawsan AlBasri to work on wastewater treatment using emulsion liquid membrane (2015/2016)

12. International Atomic Energy Agency (IAEA), Dr. Hamza Al-Bazaz (Kuwait Institute for Scientific Research (KISR), Kuwait, to work on multiphase reactors and imaging and visualization using gamma rate based techniques (one Month in 2014 and in 2015)
11. International Atomic Energy Agency (IAEA), Shaker Ebrahim (Kuwait Institute for Scientific Research (KISR), Kuwait) to work on gamma ray based techniques for multiphase reactors (Three months in 2013 and 2014)
10. US Department of State through CRDF, Dr. Saba Gheni (University of Tikrit – Iraq) to work on bubble column and packed beds (June-December 2012)
9. US Department of State through CRDF, Dr. Dr. Amer Daham Zmat to work on hydrodynamics of airlift reactors for microalgae culturing (University of Al-Qadisiyah) (June-December 2012)
8. Ministry of Higher Education and Scientific Research Education of Iraq, Dr. Yasser to work on bubble column (January– December, 2012)
7. Technical University of Dresden, Germany, Christine Meitzner to complete her MS research on flow structure in monolith using optical probe (May - November, 2011)
6. US Department of State through CRDF, Dr. Ahlam Abdulghani (University of Baghdad, Iraq) to work on nanoparticles manufacturing (April-October 2011)
5. US Department of State through CRDF, Mr. Yassif Mohammed (Ministry of Oil, Iraq) to work on multiphase reactors in oil industry (April-October, 2011)
4. US Department of State through CRDF, Mr. Hayder Hassan (Ministry of Industry and Minerals, Iraq) (April-October, 2011)
3. University of Technology, Iraq, Dr. Ghanim Maqbool Alwan for 6 months to work on process optimization (January – June, 2011)
2. China Petroleum University, Dr. X. Lan to work on CFD of gas-solid spouted beds (February 1, 2010 – January 31, 2011)
1. European Commission, Dr. Stoyan Nedeltchev for three years (two years on research at my labs and one year in Germany) to work on chaotic theory for flow regime identification of multiphase reactors (February 2010 – February 2013)

Washington University (26)

26. Beijing Chemical Technology University, China, Yuan Zhou, to complete her PhD research on multiphase monolithic reactor hydrodynamics (September 2008 – August 2009)
25. Ministry of Higher Education and Scientific Research, Iraq, Rahman Abdulmohsin, to complete his PhD research on heat transfer study in bubble column (December 2007 – April 2008)
24. Total, France, N. Dromard, to study hydrodynamics of trickle bed reactors for clean fuel production (2007-2009)
23. University of Twente, The Netherlands, Arnaud Denecheau, to study hydrodynamics of fluidized beds (2007-2009)
22. University of Sao Paulo, Brazil, Pablo Selvador, to complete his PhD research on gamma ray tomography for multiphase flow systems (September 2007-September 2008)
21. Technical University of Dresden, Germany, Tobias Baure, to complete his PhD research on structured beds performance (2007)
20. M. Arif (Pakistan Institute of Engineering and Applied Sciences (PIEAS), Pakistan) to complete his MS research on modeling multiphase flow (2007)
19. University of Pretoria, South Africa, W. v.d. Merwe, to complete his PhD research on the effect of catalyst wetting on trickle beds performance (March 2006 – September 2006)
18. University of Curtin, Australia, M. Akbar, to complete his PhD research on bubble dynamics and CFD in bubble columns (March 2006-September 2006)
17. Total, France, M. Capitaine, to study hydrodynamics of trickle bed reactors for clean fuel production (2003-2006)
16. Technical University of Dresden, Germany, R. Guettel to complete his MS research on modeling monolithic reactors (2005)
15. Technical University of Dresden, Germany, Markus Schubert, to work on his MS research on two phase flow packed beds (2005)
14. Total, France, P-Y. Lanfrey, to work on hydrodynamics of trickle beds (2005-2006)
13. Almeria University, Spain, Elisa Rodrigues, to complete her PhD research on bubble dynamics in fungi cultures (September 2004 – March 2005)

12. Sasol, South Africa (The Netherland office), K. Koop, to complete his MS research on high gas velocity bubble columns (2003-2004)
11. Dresden Technical University, Germany, A. Vold, to complete his MS research on structured packed bed reactors (2004)
10. Technical University of Dresden, Germany, Tobias Bauer, to work on his MS research on structured beds (2003)
9. Total, France, Delsart Olivier, to study hydrodynamics of trickle bed reactors for clean fuel production (2002-2003)
8. Almeria University, Spain, Dr. J. M. Fernandez, to work of movement of microalgae, (2002)
7. DuPont, USA, Boon-Tee Ong, National University of Singapore, to do research on trickle beds (1999 – Jan. 15, 2000)
6. DuPont, USA, Dr. Jacques F. Nicole, Swiss Federal Institute of Technology, Switzerland, to work on gas-solid system (riser) catalyst development and multiphase reactor (2000-2001)
5. Total, France, Dr. Pascal Fongrland, to work on fluidized beds (2000-2002)
4. Beijing University, China, Dr. B. Chen, to work on hydrodynamics of bubble column, (2000-2001)
3. National Technical University of Athens, Greece, Dr. D. Tsamatsoulis, to work of performance of trickle beds (2000)
2. Wuhan University, China, Y. Wu, to work on hydrodynamics of trickle beds (1994-195,1999-2000)
1. Martin Luther University, Germany, Jana Huettmann, to complete her Diploma research on trickle beds (1997)

DEPARTMENT AND UNIVERSITY SERVICES AND ACTIVITIES

Missouri S&T

- Chairing the Department of Chemical and Biochemical Engineering (January 2009 – June 2019)
- Member of the Curators' Distinguished Professor Selection Committee (2019-present)
- Chair of the search committee for Linda and Bipin Doshi Associate/Full Professor (2020-present)
- Member of the search committee for Director and Endowed Chair Professor of Manufacturing Center for Kummer Institute (2021)
- Member of the COPHE Governor's Award for Excellence selection committee (2021)
- Member of Faculty Excellence Award selection committee (2020)
- Member of the promotion and tenure (P&T) policy committee of the university (2019 – present)
- Member of the promotion and tenure (P&T) committee of the Department (2009-present)
- Member of the promotion and tenure (P&T) committee of the College of Engineering and Computing (2019-present)
- Member of the promotion and tenure (P&T) committee of the University (2019 – present)
- Member of the department graduate studies committee (2009 – present)
- Member of the 3-year evaluation of tenure track faculty for College of Engineering and Computing and College of Arts, Science and Business (2019-present)
- Member of the Missouri S&T Radiation Safety Committee, 2016 - present
- Played a key role in the fund raising, design, construction and establishment of the Bertelsmeyer Hall and its state-of-the-art research and teaching infrastructure
- Hired 10 faculty members since January 2009 and oversaw the search committees
- Member of the external functions and activities planning committee for Deans transition from no-Deans, February – April, 2014
- Member of the College of Engineering and Computing (CEC) Dean/Chairs group and its meetings for discussing and development of the college and university (2014 – June 2019)
- Chair of the department ABET committee and was instrumental in obtained ABET Accreditation
- Member of the committee for recruiting Laufer Chair in Energy under the supervision of the Chancellor, 2011-2012
- Serving in all the department committees
- Working with the department academy and alumni for enhancing our department capacity, CEC and S&T
- Chairing the new building (Bertelsmeyer Hall) committee (2012-2014)
- Serving on many graduate students' theses committees

Washington University

- Spearheaded the effort of revamping the capstone design course (2001 – 2007) to have the design projects performed at the local industry premises on real industrial problems.
- Established (in 2004) a procedure with the Washington University Environmental Health and Safety (EH&S) office for inspecting the department laboratories and for providing annual training on safety to graduate and undergraduate students
- Chair of the Chemical Process Safety Committee, which I formed for the Chemical Engineering Department (2000 – 2004)
- Member of the CEC (Center for Engineering Computing) Faculty Advisory Board Committee (1995 – 1997; 2005-2008).
- Member of promotion committee for full professor (2006)
- Member of new faculty search committee (2006)
- Member of undergraduate department curriculum committee (1999 and 2001- 2008)
- Member of graduate curriculum committee (2003-2008)
- Member of graduate admitting committee (2004- 2008)
- Chair of the undergraduate laboratory committee (1999 – 2008)

INVITED PLENARY/KEYNOTE LECTURES – NATIONAL & INTERNATIONAL

53. (2020) Recent Advances on Selected Environmental Biotechnology and Bioenergy Using Sophisticated Measurement and Computing Techniques
    The 2nd Annual International Conference on Information and Sciences, AICIS 2020, University of Faluja, via Zoom, November 24-25, 2020
52. (2019) Multiphase Flow and CFD Benchmarking using Integrated Advanced Measurement Techniques
    International Nuclear Atlantic Conference, INAC 2019, Nuclear New Horizons: Fueling our Future- Santos, Sao Paulo State, Brazil, October 21-25, 2019
51. (2019) Current Development in Process Tomography in USA
    (TOMOCOON-2019), Delft TU, The Netherland, June 27, 2019
50. (2019) Catalyst Utilization and Hydrodynamics of Hydrotreating Trickle Beds Packed with Industrial Catalyst Shapes
    (ISAHOF 2019), Mexico City, Mexico, June 9-12, 2019
49. (2019) Managing Carbon by Advancing Microalgae/ Cyanobacteria Culturing for Bioenergy, Clean Water and Flue Gases, Sustain Environment and Valued Products
    3rd Scientific Conference of Postgraduate Research, Chemical Engineering, University of Technology, Baghdad, Iraq, May 5, 2019
48. (2019) Gas Conversion to clean liquid fuels and chemicals: Overview of recent advances and the challenges of catalytic Fischer-Tropsch multiphase reactors using sophisticated measurement and computing techniques
    ACS spring meeting, April 2, 2019
47. (2018) Overview of Industrial Process Tomography, Regional Training Course on Capacity Building for Industrial Tomography Applications
    Nuclear and Energy Research Institute (IPEN-CNEN), São Paulo, Brazil, Oct 2018
46. (2018) Implementation of cross-correlation method in flow rate and velocity of phases measurements using various Advanced measurement techniques
    International Atomic Energy Agency (IAEA) consultants meeting, Krakow, Polland, June 25-29, 2018
45. (2018) Advances of Hydrodynamics and Heat Transfer of Gas-Solid Reactors and Gas-Solid Moving Beds
    The International-Mexican Congress on Chemical Reaction Engineering (IMCCRE) June 2018
44. (2017) Multi-Scale Modeling for Advancing the Performance Prediction and Optimization of Two-Phase Flow Packed Reactors
    The Total Annual Seminar on Mathematics, Numerical Simulations, Numerical Methods, HPC, Data Science (MATHIAS 2017), Hotel L'Elysee, Val d'Europe, Disneyland Paris, France, October 25-27, 2017

43. (2017) Recent advances of the hydrodynamics of two phase flow moving bed for catalytic hydrotreating: experimentation and computing investigations
    The 10th – International Symposium on Catalysis in Multiphase Reactors (CAMURE-10) and the 9th International Symposium on Multifunctional Reactors (ISMR-9), Qingdao, China, July 7-10, 2017
42. (2017) Recent Advances in Understanding of the Hydrodynamics of Two Phase Flow Packed and Moving Bed Reactors for Petroleum Hydrotreating
    International Symposium on Advances in Hydroprocessing of Oil Fractions, (ISAHOF 2017), Mexico City, Mexico, June 4-8, 2017
41. (2017) The Role of Advancing Multiphase Reactors in Minimizing the Wastes from Oil and Gas Industry, International Conference on Environmental Impacts of the Oil and Gas Industries
    EIOGI 2017, Koya University, Koya – Kurdistan – Iraq, April 17-19, 2017
40. (2017) Advancing Petroleum and Gas Processes Multiphase Reactors and Multiphase Flow by Sophisticated Measurement Techniques and Benchmarking CFD
    Institute Mexico de Petroleum, Mexico, February 15, 2017
39. (2016) Enabling New Mechanistic Scale-up Methodologies of Multiphase Reactors via Advanced Measurement and Computational Techniques
    International Mexican Congress on Chemical Reaction Engineering (IMCCRE), Queretaro, Mexico, June 5-9, 2016
38. (2016) Multiphase Reactors and Multiphase Flow systems Are the Key for Process Development and Advancement: What Are the Needs
    WSEAS, ICESEEI 16, Barcelona, Spain, February 13-15, 2016
37. (2016) Benchmarking CFD and Enabling Scale-up of Petroleum Refinery Multiphase Reactors by Advanced Measurement Techniques
    Takreer, 6th TRC-JCCP/IDEMITSU International Symposium, Abu Dhabi, UAE, February 10-11, 2016
36. (2015) Advanced Measurements Techniques for Benchmarking Modeling and CFD and for New Mechanistic Approaches for Enabling Scale-up of Energy, Water, Environment and Food Nexus Processes
    Arab Academy of Science, Amman, Jordan, December 5-6, 2015
35. (2015) CFD Benchmarking for Enabling Scale-up from Labs to Industrial Scales via Advanced Measurement Techniques
    International Symposium on Advances in Hydroprocessing of Oil Fractions (ISAHOF 2015), Cuernavaca, Mexico, June 6-11, 2015
34. (2014) Laboratory Software and Modeling: CFD Benchmarking for Enabling Scale-up from Lab to Industrial Scales via Advanced Measurement Techniques
    The 3rd International Conference & Exhibition on Laboratory Technology, Organized by ARAMCO, Manama, Bahrain, October 28-30, 2014
33. (2014) Recent Advances on Bubble and Slurry Bubble Columns with Internals for Clean Alternative Fuels Production
    International Mexican Congress on Chemical Reaction Engineering, IMCCRE 2014, Acapulco, Mexico, June 7-13, 2014
32. (2014) The Role of Multiphase Reactors in “Green” Petroleum Industry via Sophisticated Techniques
    3rd Kuwait Conference of Chemistry, Under the Patronage of Amir Of Kuwait, Petroleum Industry and Environment, KCC2014, Kuwait, March 9-11, 2014
31. (2013) Advancing Multiphase Processes for Sustainable and Cleaner Energy, Products and Environment via Sophisticated Techniques
    1st National Conference on Environment, Environmental Research Center, University of Technology, Baghdad, Iraq, December 29-31, 2013
30. (2013) Industrial Process Tomography and Visualization Using Nuclear Technology
    IX ENAN, the 2013 International Nuclear Atlantic Conference (INAC 2013), Recife, Brazil, November 24-29, 2013
29. (2012) Benchmarking Multiphase CFD Results via Sophisticated Experimental Measurements Techniques and Facilities, Trends in Physical and Numerical Modeling for Industrial

Multiphase Flows, CFD and its experimental validation for multiphase flows: the state of the art

Cargese, Corsica, France, September 24-28, 2012

28. (2012) How Laboratory Investigation Assist Process Commercialization – Selected Examples Including Scale-up Methodology

International Mexican Congress on Chemical Reaction Engineering (IMCCRE), Ixtapa, Mexico, June 10-12, 2012

27. (2011) Recent Research and Development of Various Processes for Sustainable Energy and Environment

The Role of Chemical Engineering in Developing National Economy, Saudi Chemical Engineer's First Forum, King Saud University, Riyadh, May 17-18, 2011

26. (2010) Twining the Research of Higher Education in Iraq with the World Universities for Lifting the Quality of MS and PhD Research

2nd conference of the Academic Quality and accreditation, Ministry of Higher Education and Scientific Research of Iraq, Kufa University, Kufa, Iraq, December 26-28, 2010

25. (2010) Cleaner and Efficient Coal Utilization: For Coal to be An Essential Part of Sustainable US Energy Solution

2010 SAME Missouri River/Texoma Regional and Midwest Levee Conference – Society of American Military Engineers (SAME), St. Louis, July 12-14, 2010

24. (2010) Advancement of catalytic Fischer-Tropsch slurry bubble columns via advanced measurement techniques for renewable fuels, Energy and Chemicals production

International Conference on Catalysis for Renewable Sources: Fuels, Energy, Chemicals, Tsars Village, St. Petersburg, Russia, June 28 – July 2, 2010

23. (2009) Prospective of nuclear imaging and visualization in industrial processes

IX ENAN (meeting on nuclear applications, INAC 2009 (International Nuclear Atlantic Conference), ENIN (meeting on nuclear industries, XVI ENFIR (meeting on reactor physics and thermal hydraulics), Rio de Janeiro, Brazil, September 27 – October 2, 2009

22. (2009) Integrating Iraqi Scientific and Technological Research and Higher Education with the World Leading Centers and Institutions: How to help Iraqi R&D and higher education, How to create an international partnerships for science and technology: sustainable energy and environment, How to bridge the gap between scientific and technological R&D and industry needs – translating research results into applications

Sponsored by Prime Minister of Iraq; Ministry of Science and Technology, Baghdad, Iraq June 22-24, 2009

21. (2008) A novel multi-scale modeling approach for microalgae growth in multiphase photo bioreactors for bioenergy and power plant flue gas treatment

CLRI Dr. Y. Nayudamma Distinguished Speaker Award, USA-India on Energy and Sustainability Symposium, CHEMCON-08, Chantigarh, Punjab, India, December 28-30, 2008

20. (2008) Radioisotope applications in the petrochemical industry: An overview

International Symposium on the Peaceful Applications of Nuclear Technology in the Gulf Cooperation Council (GCC) Countries, Jeddah, Saudi Arabia November 3-7, 2008

19. (2008) Al-Dahhan, M.H.; Yablonsky, G.S.; Gleaves, J.T.; Zheng, X.; Feres, R., Getting to the point: From molecular to process scales

XVIII International Conference on Chemical Reactors, Malta, September 29 to October 3, 2008

18. (2007) CFD be used to predict culturing photosynthetic cultures for bioenergy production and flue gas treatment?

IBCAST – 2007, Pakistan, January 8-12, 2007

17. (2007) Comparison between hydrodynamics of lab and pilot scale gas recirculation digesters for bioenergy production using CFD and its evaluation versus experimental data

IBCAST – 2007, Pakistan, January 8-12, 2007

16. (2007) Intensification of Microalgae culturing in photo bioreactors for renewable energy via novel modeling approach
    Slovak Society of Chemical Engineering, 34th International Conference of Tatranske Matliare, Slovakia, May 21-25, 2007
15. (2007) Advancement of trickle bed reactors and their scale-up for clean fuels and chemicals production
    International Symposium on Advances in Hydroprocessing of Oil Fractions (ISAHOF 2007), Morelia, Michoacan, Mexico, June 26-29, 2007
14. (2007) FT Synthesis for clean alternative energy – Industry and Academia collaboration
    Idaho Academy of Science Symposium, Synthetic fuels, April 19-21, 2007
13. (2007) Recent advances in Radioactive Particle Tracking techniques
    International Atomic Energy Agency, Consultants meeting, Vienna, Austria, October 22, 2007
12. (2006) Advances in Reactor Technology for Fischer-Tropsch Synthesis with Biomass as a Feedstock: A New Methodology for Scale-up of Bubble Column Reactors
    BTLtech06, (Biomass to liquid fuels and chemicals tech), Munich, Germany, October 16-17, 2006
11. (2006) Culturing Microalgae in Photo bioreactors: Advanced Modeling and Experimentation
    South African Chemical Engineering Congress, 20-22, September, Durban, South Africa
10. (2006) M.P. Dudukovic and M.H. Al-Dahhan, Multiphase Reaction in Bioenergy production
    Bioenergy I: from concept to commercial production, ECI, Tomar, Portugal, March 5-10
9. (2005) Prediction of microalgae culture growth in photo bioreactors using CFD
    IBCAST 2005, 4th International Bhurban Conference on Applied Sciences, Pakistan, June 16-18
8. (2005) Advanced modeling and experimentation of the microalgae growth in photo bioreactors
    International Seminar on Advances in Chemical Engineering, UICT, Institute of Chemical Technology, University of Mumbai, December, 2005
7. (2005) A New Mechanistic Methodology for Scale-up of Bubble Column Reactors
    5th International Chemical Engineering Conference, Amman, Jordan, September 12-14, 2005
6. (2005) Microalgae Culture Growth with the Help of CFD
    4th International Bhurban Conference on Applied Sciences and Technology, Bhurban, Pakistan, June 13-18, 2005
5. (2004) Al-Dahhan, M. H., Palmisano, E., Ramachandran, P. A., Balakrishna, K., Computation of effectiveness factors for partially wetted complex catalyst shapes using the method of fundamental solution
    ISAHOF, Oaxaca, Mexico, 18-22 April, 2004
4. (2003) Phase Distribution in a High Pressure Slurry Bubble Column via Computed Tomography
    3rd world Congress on Industrial Tomography, Banff, Canada, September 2-5, 2003
3. (2001) Tomography and velocimetry for multiphase reactors: A perspective from the USA
    2nd World Congress on Industrial Process Tomography, Hannover, Germany, August, 29-31, 2001
2. (2001) Engineering studies of photo bioreactors via advanced diagnostic techniques
    Biochemical Engineering XII: Back to future: application of biochemical engineering fundamentals to modern problems, Marine Biotechnology, Rohnert Park, CA, June 10-15, 2001
1. (2000) NSF STARS Summer Program – Review
    University of Missouri in St. Louis, Invited to represent Washington University Faculty, July 28, 2000

PUBLICATIONS

Peer Reviewed Journals Publications

246. Binbin Qi, Omar Farid, Alexandre França Velo, Jihane Mendil, Sebastián Uribe, Yasunobu Kaneko, Kei Sakakura, Yasuhito Kagota, Muthanna Al-Dahhan, Tracking the heavy metal contaminants entrained with the flow into a Trickle bed hydrotreating Reactor packed with different catalyst shapes using newly developed noninvasive Dynamic radioactive particle Tracking,
Chemical Engineering Journal, Vol. 429, 132277, (**2021**).
245. Harith N. Mohammed, Safaa M.R. Ahmed, Hayder Al-Naseri, Muthanna Al-Dahhan, Enhancement of CO_2 desorption from MEA-based nanofluids in membrane contactor: Simulation study,
Chemical Engineering and Processing - Process Intensification, Vol 168, 108582, (**2021**).
244. Lu Han, Premkumar Kamalanathan, Muthanna Al-Dahhan, Study of the detailed catalyst hydrodynamics using radioactive particle tracking technique in a mimicked Fischer-Tropsch slurry bubble column,
Chemical Engineering Science, Vol. 241, 116659, (**2021**).
243. Sebastián Uribe, Haidar Taofeeq, Muthanna Al-Dahhan, Modelling and validation of a gas-solid fluidized bed using advanced measurement techniques,
The Canadian Journal of Chemical Engineering, https://doi.org/10.1002/cjce.24070*,* (**2021**).
242. Marwah Al-Azzawi, Marwah Al-Azzawi, Farouq Mjalli, Afzal Husain, and Muthanna Al-Dahhan, A Review on the Hydrodynamics of the Liquid–Liquid Two-Phase Flow in the Microchannels,
Industrial & Engineering Chemistry Research, Vol. 60, 5059-5075, (**2021**).
241. Ashfaq Shaikh, Mahmoud M Taha, Muthanna H Al-Dahhan, Phase distribution in Fischer-Tropsch mimicked slurry bubble column via computed tomography,
Chemical Engineering Science, Vol 231, 116278, (**2021**)
240. Hayder A. Alhameedi, Aso A. Hassan, Joseph D. Smith, and Muthanna Al-Dahhan, Toward a Better Air-Assisted Flare Design for Purge Flow Conditions: Experimental and Computational Investigation of Radial Slot Flow into a Crossflow Environment,
Industrial & Engineering Chemistry Research, *Vol. 60, 2634-2641*, (**2021**)
239. Sebastián Uribe, Binbin Qi, Mario E Cordero, Muthanna Al-Dahhan, Comparison between Pseudohomogeneous and Resolved-Particle Models for Liquid Hydrodynamics in Packed-Bed Reactors,
Chemical Engineering Research and Design, *Vol 166, 158-171,* (**2021**).
238. Qusay Al-Obaidi, Malak Alabdulmuhsin, Alice Tolstik, Jacob G Trautman, Muthanna Al-Dahhan, Removal of hydrocarbons of 4-Nitrophenol by emulsion liquid membrane (ELM) using magnetic Fe2O3 nanoparticles and ionic liquid,
Journal of Water Process Engineering, Vol 39, 101729, (**2021**).
237. Mohammed Al-Ani, Muthanna Al-Dahhan, Effect of catalyst shape on pressure drop and liquid holdup in a pilot plant trickle bed reactor,
Fuel, Vol. 284, 118860, (**2021**).
236. Sebastián Uribe, Nasser Zouli, Mario E Cordero, Muthanna Al-Dahhan, Development and validation of a mathematical model to predict the thermal behaviour of nanofluids,
Heat and Mass Transfer, Vol. 57, 93-110, (**2021**).
235. Binbin Qi, Sebastián Uribe, Omar Farid, Muthanna Al-Dahhan, Development of a hybrid pressure drop and liquid holdup phenomenological model for trickle bed reactors based on two-phase volume averaged equations,
The Canadian Journal of Chemical Engineering, https://doi.org/10.1002/cjce.23892, (**2020**).
234. Richard A. Bausell, Charles W. Lyon, Muthanna H. Al-Dahhan, Improving Soft Skills Through Mentorship,
Chemical Engineering Progress (CEP), December 2020, **(2020)**.
233. Lu Han, Premkumar Kamalanathan, Muthanna H Al-Dahhan, Gas–liquid mass transfer using advanced optical probe in a mimicked FT slurry bubble column,
International Journal of Chemical Reactor Engineering, https://doi.org/10.1515/ijcre-2020-0143, (**2020**).

232. Aastha Ojah, Laith S Sabri, Muthanna H Al-dahhan, Local volumetric mass transfer coefficient estimation for Scenedesmus microalgae culture in a cylindrical airlift photobioreactor, *Journal of Chemical Technology and Biotechnology*, https://doi.org/10.1002/jctb.6590 , (**2020**).
231. Vineet Alexander, Hamza Albazzaz, Muthanna Al-Dahhan, Local hydrodynamics investigation of industrial scaled-down upflow moving-bed hydrotreater reactor using a two-tip optical probe, *The Canadian Journal of Chemical Engineering*, https://doi.org/10.1002/cjce.24013, (**2020**)
230. Abdelsalam Efhaima, Muthanna H Al-Dahhan, Validation of the new mechanistic scale-up of gas-solid fluidized beds using advanced non-invasive measurement techniques, *The Canadian Journal of Chemical Engineering*, https://doi.org/10.1002/cjce.23938, (**2020**)
229. Saba A. Gheni, Saad A. Awad, Safaa M. R. Ahmed, Ghassan H. Abdullah, Muthanna Al Dahhan, Nanoparticle catalyzed hydrodesulfurization of diesel fuel in a trickle bed reactor: experimental and optimization study, *Royal Society of Chemistry Advances, RSC Adv., 10, 33911-33927, (**2020**).*
228. Ashfaq Shaikh, Mahmoud M Taha, Novica Rados, Muthanna H Al-Dahhan, Phase distribution in Fischer-Tropsch mimicked slurry bubble column via computed tomography, *Chemical Engineering Science, 116278, (**2020**).*
227. Binbin Qi, Omar Farid, Sebastián Uribe, Muthanna Al-Dahhan, Maldistribution and dynamic liquid holdup quantification of quadrilobe catalyst in a trickle bed reactor using gamma-ray computed tomography: Pseudo-3D modelling and empirical modelling using deep neural network, *Chemical Engineering Research and Design, Vol 164, 195-208, (**2020**).*
226. Astha Ojah, Laith S. Sabri, Muthanna H. Al-Dahhan, Local Volumetric Mass Transfer Coefficient Estimation for Microalgae Scenedesmus in Cylindrical Airlift Photobioreactor, *Journal of Chemical Technology and Biotechnology,* https://doi.org/10.1002/jctb.6590*, (**2020**).*
225. Sebastián Uribe, Binbin Qi, Omar Farid, Muthanna Al-Dahhan, Mathematical Modeling and Pointwise Validation of a Spouted Bed Using an Enhanced Bed Elasticity Approach, *Energies, Vol 13, 4738,* (**2020**).
224. Laith S Sabri, Abbas J Sultan, Muthanna H Al-Dahhan, Split internal-loop photobioreactor for Scenedesmus sp. microalgae: Culturing and hydrodynamics, *Chinese Journal of Chemical Engineering,* https://doi.org/10.1016/j.cjche.2020.07.058 (**2020**).
223. Claudio Antonio Reyes-Antonio, Mario E Cordero, Hugo Pérez-Pastenes, Sebastián Uribe, Muthanna Al-Dahhan, Analysis of the effect of hydrodynamics over the activity and selectivity of the oxidative dehydrogenation of propane process in a packed bed reactor through CFD techniques, *Fuel, Vol 280, pp 118510,* (**2020**).
222. Sebastián Uribe, Mohammed Al-Ani, Mario E. Cordero, Muthanna Al-Dahhan, Modelling and validation of TBR Hydrodynamics: Local comparison between CFD and experiments, *Fuel, Vol 277, pp 118244,* (**2020**).
221. Shaibal Roy, Premkumar Kamalanathan, Peter Lehner, Thomas Turek, Muthanna Al-Dahhan, Effect of phase maldistribution on performance of two-phase catalytic monolith reactor and its comparison with trickle bed reactor, *The Canadian Journal of Chemical Engineering, Vol 98, 294-307,* **(2020)**.
220. Humayun Shariff, Muthanna H Al-Dahhan, Analyzing the impact of implementing different approaches of the approximation of the catalyst effectiveness factor on the prediction of the performance of trickle bed reactors, *Catalysis Today,* Vol 353, 134-145, (**2019**).
219. Fatin A. Ashoor, Amer D. Zmat, Muthanna H. AlDahhan, Pellet Softening Process for the Removal of the Groundwater Hardness; Modelling and Experimentation, *Al-Qadisiyah Journal for Engineering Sciences,* Vol 12, 135–143, (**2019**).
218. Muthanna Al-Dahhan, Advanced measurement techniques for enabling multiphase reactors and flow systems for sustainable and cleaner processes, Editorial, *Journal of King Saud University – Engineering Sciences, Vol 31, 201*, (**2019**).
217. Laith S Sabri, Abbas J Sultan, Muthanna H Al-Dahhan, Investigating the Cross-Sectional Gas Holdup Distribution in a Split Internal-loop Photobioreactor during Microalgae Culturing Using a Sophisticated Computed Tomography (CT) Technique, *Chemical Engineering Research and Design, Vol 149, 13-33*, (**2019**).

216. Thaar Al-Juwaya, Neven Ali, Muthanna Al-Dahhan, Investigation of hydrodynamics of binary solids mixture spouted beds using radioactive particle tracking (RPT) technique,
Chemical Engineering Research and Design, Vol 148, 21-44, (**2019**).
215. Hayder Al-Naseri, J. P. Schlegel, and Muthanna H. Al-Dahhan, The Effects of Internals and Low Aspect Ratio on the Fully Developed Flow Regime and Bubble Properties in a Pilot-Plant Bubble Column,
Experimental Thermal and Fluid Science, Vol 104, 284-301, (**2019**).
214. Shaibal Roy, Premkumar Kamalanathan, Muthanna Al-Dahhan, Integration of phase distribution from gamma-ray tomography technique with monolith reactor scale modeling,
Chemical Engineering Science, Vol 200, 27-37, (**2019**).
213. Neven Ali, Thaar Aljuwaya, Muthanna Al-Dahhan, Evaluating the new mechanistic scale-up methodology of gas-solid spouted beds using gamma ray computed tomography (CT),
Experimental Thermal and Fluid Science, Vol 104, 186-198, (**2019**).
212. Nasser Zouli, Ibrahim A. Said, Muthanna Al-Dahhan, Enhancement of thermal conductivity and local heat transfer coefficients using Fe_2O_3 / Water nanofluid for improved thermal desalination processes,
Journal of Nanofluids, Vol 8, 1103-1122, (**2019**).
211. Mahmoud M Taha, Ibrahim A Said, Shoaib Usman, Muthanna H Al-Dahhan, Temperature and velocity instrumentation and measurements within a separate-effects facility representing modular reactor core,
International Journal of Thermal Sciences, Vol 136, 148-158, (**2019**).
210. Ahmed A. Jasim, Abbas J Sultan, Muthanna H Al-Dahhan, Influence of heat-exchanging tubes diameter on the gas holdup and bubble dynamics in a bubble column,
Fuel, Vol 236, 1191-1203, (**2019**).
209. Haidar Taofeeq, Muthanna Al-Dahhan, Investigation of the effect of vertical immersed tube diameter on heat transfer in a gas-solid fluidized bed,
International Journal of Thermal Sciences, Vol 135, 546-558, (**2019**).
208. Vineet Alexander, Hamza Albazzaz, Muthanna Al-Dahhan, Gas phase dispersion/mixing investigation in a representative geometry of gas-liquid upflow moving bed hydrotreater reactor (MBR) using developed gas tracer technique and method based on convolution/ regression,
Chemical Engineering Science, Vol 195, 671-682, (**2019**).
207. Moses Kagumba, Hayder Al-Naseri, Muthanna H. Al-Dahhan, A new contact time model for the mechanistic assessment of local heat transfer coefficients in bubble column using both the four-optical fiber probe and the fast heat transfer probe-simultaneously,
Chemical Engineering Journal, Vol 361, 67-79, (**2019**).
206. Ahmed A Jasim, Abbas J Sultan, Muthanna H Al-Dahhan, Impact of heat exchanging internals configurations on the gas holdup and bubble properties in a bubble column,
International Journal of Multiphase Flow, Vol 112, 63-82, (**2019**).
205. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, Mapping of Microalgae Culturing via Radioactive Particle Tracking,
Chemical Engineering Science, Vol 192, 739-758, (**2018**).
204. Abbas J Sultan, Laith S Sabri, Muthanna H Al-Dahhan, Investigating the influence of the configuration of the bundle of heat exchanging tubes and column size on the gas holdup distributions in bubble columns via gamma-ray computed tomography,
Experimental Thermal and Fluid Science, Vol 98, 68-85, (**2018**).
203. Haidar Taofeeq, Muthanna Al-Dahhan, Flow Regimes in Gas-Solid Fluidized Bed with Vertical Internals,
Chemical Engineering Research and Design, Vol 138, 87-104, (**2018**).
202. Haidar Taofeeq, Shreekanta Aradhya, Jianbin Shao, Muthanna Al-Dahhan, Advance optical fiber probe for simultaneous measurements of solids holdup and particles velocity using simple calibration methods for gas-solid fluidization systems,
Flow Measurement and Instrumentation, Vol 63, 18-32, (**2018**).
201. Haidar Taofeeq, Muthanna Al-Dahhan, The impact of vertical internals array on the key hydrodynamic parameters in a gas-solid fluidized bed using an advance optical fiber probe,
Advanced Powder Technology, Vol 29, 2548-2567, (**2018**).

200. Haidar Taofeeq, Muthanna Al-Dahhan, Effect of vertical internals on the pressure drop in a gas-solid fluidized bed,
The Canadian Journal of Chemical Engineering, Vol 96, 2185-2205, (**2018**).
199. Abbas J Sultan, Laith S Sabri, Jianbin Shao, Muthanna H Al-Dahhan, Overcoming the gamma-ray computed tomography data processing pitfalls for bubble column equipped with vertical internal tubes,
The Canadian Journal of Chemical Engineering, Vol 96, 2206-2226, (**2018**).
198. Salman M. Alshehri, Ibrahim A. Said, Muthanna H. Al-Dahhan, Shoaib Usman, Plenum-to-plenum natural convection heat transfer within a scaled-down prismatic modular reactor facility,
Thermal Science and Engineering Progress, Vol 7, 288-301, (**2018**).
197. Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan, Influence of the size of heat exchanging internals on the gas holdup distribution in a bubble column using gamma-ray computed tomography,
Chemical Engineering Science, Vol 186, 1-25, (**2018**).
196. Fadha Al Falahi, Gary Mueller, Muthanna Al-Dahhan, Pebble bed nuclear reactor structure study: A comparison of the experimental and calculated void fraction distribution,
Progress in Nuclear Energy, Vol 106, 153-161, (**2018**).
195. Haidar Taofeeq, Muthanna Al-Dahhan, Heat transfer and hydrodynamics in a gas-solid fluidized bed with vertical immersed internals,
International Journal of Heat and Mass Transfer, Vol 122, 229–251, (**2018**).
194. Ibrahim A Said, Mahmoud M Taha, Vineet Alexander, Shoaib Usman, Muthanna H Al-Dahhan, Axial dispersion and mixing of coolant gas within a separate-effect prismatic modular reactor,
Nuclear Energy and Technology, Vol 4, 167-178, (**2018**).
193. Mahmoud M. Taha, Ibrahim A. Said, Shoaib Usman, Muthanna H. Al-Dahhan, Buoyancy-driven air flow within plenum-to-plenum facility down-comer channel,
Experimental Thermal and Fluid Science, Vol. 94, 205-214, (**2018**).
192. Abbas J Sultan, Laith S Sabri, Muthanna H Al-Dahhan, Impact of Heat-Exchanging Tube Configurations on the Gas Holdup Distribution in Bubble Columns using Gamma-Ray Computed Tomography,
International Journal of Multiphase Flow, Vol 106, 202-219, (**2018**).
191. Aastha Ojha, Muthanna Al-Dahhan, Investigation of local gas holdup and bubble dynamics using four-point optical probe technique in a split-cylinder airlift reactor,
International Journal of Multiphase Flow, Vol. 102, 1-15, (**2018**).
190. Mahmoud M. Taha, Ibrahim A. Said, Shoaib Usman, Muthanna H. Al-Dahhan, Natural convection inside heated channel of a facility representing prismatic modular reactor core,
AIChE Journal, Vol 64, 3467-3478, (**2018**).
189. Ibrahim A Said, Mahmoud M Taha, Shoaib Usman, Muthanna H Al-Dahhan, Experimental investigation of the helium natural circulation heat transfer in two channels facility using varying riser channel heat fluxes,
Experimental Thermal and Fluid Science, Vol 93, 195-209, (**2018**).
188. Haidar Taofeeq, Muthanna Al-Dahhan, Comparison between the new mechanistic and the chaos scale-up methods for gas-solid fluidized beds,
Chinese Journal of Chemical Engineering, Vol 26, 1401-1411, (**2018**).
187. Ibrahim A Said, Mahmoud M Taha, Shoaib Usman, Muthanna H Al-Dahhan, Effect of helium pressure on natural convection heat transfer in a prismatic dual-channel circulation loop,
International Journal of Thermal Sciences, Vol 124, 162-173, (**2018**).
186. Aastha Ojha, Muthanna Al-Dahhan, Local gas holdup and bubble dynamics investigation during microalgae culturing in a split airlift photobioreactor,
Chemical Engineering Science, Vol 175, 185-198, (**2018**).
185. Lu Han, Ibrahim A Said, Muthanna H Al-Dahhan, Gas phase back-mixing in a mimicked fischer-tropsch slurry bubble column using an advanced gaseous tracer technique,
International Journal of Chemical Reactor Engineering, Vol 17, 1-14, (**2018**).
184. Sawsan A.M. Mohammed, Nasser Zouli, Muthanna Al-Dahhan, Removal of phenolic compounds from synthesized produced water by emulsion liquid membrane stabilized by the combination of surfactant and ionic liquid,
Desalination and Water Treatment, Vol 110, 168–179, (**2018**).

183. Neven Ali, Thaar Al-Juwaya, Muthanna Al-Dahhan, An advanced evaluation of the mechanistic scale-up methodology of gas–solid spouted beds using radioactive particle tracking, *Particuology, Vol 34, 48-60,* (**2017**).
182. Thaar Al-Juwaya, Neven Ali, Muthanna Al-Dahhan, Investigation of cross-sectional gas-solid distributions in spouted beds using advanced non-invasive gamma-ray computed tomography (CT), *Experimental Thermal and Fluid Science, Vol 86, 37-53,* (**2017**).
181. Shreekanta Aradhya, Haidar Taofeeq, Muthanna Al-Dahhan, Evaluation of the dimensionless groups based scale-up of gas–solid spouted beds, *International Journal of Multiphase Flow, Vol 94, 209-218,* (**2017**).
180. Ali Toukan, Vineet Alexander, Hamza AlBazzaz, Muthanna H Al-Dahhan, Identification of flow regime in a cocurrent gas–Liquid upflow moving packed bed reactor using gamma ray densitometry, *Chemical Engineering Science, Vol 168, 380, 390,* (**2017**).
179. Muthanna Al-Dahhan, Shreekanta Aradhya, Haidar Taofeeq, Prediction of spout diameter in gas-solid spouted beds using factorial design of experiments approach with the aid of advanced optical fiber probe, *The Canadian Journal of Chemical Engineering, Vol 95, 1463-1470,* (**2017**).
178. Shreekanta Aradhya, Haidar Taofeeq, and Muthanna Al-Dahhan, Flow regime identification in spouted beds using gamma-ray densitometry, *Flow Measurement and Instrumentation, Vol 55, 67-72,* (**2017**).
177. Mohammed K. Al Mesfer, Abbas J. Sultan, Muthanna H. Al-Dahhan, Study the effect of dense internals on the liquid velocity field and turbulent parameters in bubble column for Fischer–Tropsch (FT) synthesis by using Radioactive Particle Tracking (RPT) technique, *Chemical Engineering Science, Vol 161, 228-248,* (**2017**).
176. Rahman S. Abdulmohsin, Muthanna H. Al-Dahhan, Pressure drop and fluid flow characteristics in a packed pebble-bed reactor, *Nuclear Technology Journal, Vol 198, 17-25,* (**2017**).
175. Abdelsalam Efhaima, Muthanna H Al-Dahhan, Bed diameter effect on the hydrodynamics of gas-solid fluidized beds via radioactive particle tracking (RPT) technique, *The Canadian Journal of Chemical Engineering, Vol 95, 744-756,* (**2017**).
174. Abdelsalam Efhaima, Muthanna H Al-Dahhan, Assessment of scale-up dimensionless groups methodology of gas-solid fluidized beds using advanced non-invasive measurement techniques (CT and RPT), *The Canadian Journal of Chemical Engineering, Vol 95, 656-669,* (**2017**).
173. Vaibhav Khane, Ibrahim A Said, Muthanna H Al-Dahhan, Assessment of performing experimental investigation on a pebble bed modular reactor (PBMR) as a static packed bed approximation, *Annals of Nuclear Energy, Vol 101, 339-346,* (**2017**).
172. Vaibhav Khane, and Muthanna H. Al-Dahhan, Hybrid dynamic radioactive particle tracking (RPT) calibration technique for multiphase flow systems, *Measurement Science and Technology, Vol 28, 055904 (16pp),* (**2017**).
171. Neven Ali, Thaar Al-Juwaya, Muthanna Al-Dahhan, An advanced evaluation of spouted beds scale-up for coating TRISO nuclear fuel particles using Radioactive Particle Tracking (RPT), *Experimental Thermal and Fluid Science, Vol 80, 90-104,* (**2017**).
170. Sawsan AM Mohammed, Nasser Zouli, Muthanna Al-Dahhan, Removal of benzoic acid from wastewater by pickering emulsion liquid membrane stabilized by magnetic Fe2O3 nanoparticles, *Desalination and Water Treatment, Vol 68, 114-121,* (**2017**).
169. Deepali Chugh, Shantanu Roy, Jianbin Shao, Muthanna H. Al-Dahhan, Experimental investigation of gas-liquid flow in monolith channels using monofiber optical probes, *AIChE Journal, Vol 63, 327-336,* (**2017**).
168. Ibrahim A. Said, Mahmoud M Taha, Shoaib Usman, Brian G Woods, Muthanna H Al-Dahhan, Investigation of natural convection heat transfer in a unique scaled-down dual-channel facility, *AIChE Journal, Vol 63, 387-396,* (**2017**).
167. Vaibhav Khane, Mahmoud M Taha, Gary E Mueller, Muthanna H Al-Dahhan, Discrete element method (DEM)–based investigations of granular flow in a pebble bed reactor (PBR),

Nuclear Technology, Vol 199, 47-66, (**2017**).

166. Shreekanta Aradhya, Haidar Taofeeq, Muthanna Al-Dahhan, A new mechanistic scale-up methodology for gas-solid spouted beds,
Chemical Engineering and Processing: Process Intensification, Vol 110, 146-159, (**2016**).
165. Vaibhav Khane, Mahmoud M Taha, Muthanna H Al-Dahhan, Experimental investigation of the overall residence time of pebbles in a pebble bed reactor (PBR) using radioactive pebble,
Progress in Nuclear Energy, Vol 93, 267-276, (**2016**).
164. Fadha Al Falahi, Muthanna Al-Dahhan, Experimental investigation of the pebble bed structure by using gamma ray tomography,
Nuclear Engineering and Design, Vol 310, 231-246, (**2016**).
163. Neven Ali, Thaar Al-Juwaya, Muthanna Al-Dahhan, Demonstrating the non-similarity in local holdups of spouted beds obtained by CT with scale-up methodology based on dimensionless groups,
Chemical Engineering Research and Design, Vol 114, 129-141, (**2016**).
162. Mohammed K Al Mesfer, Abbas J Sultan, Muthanna H Al-Dahhan, Impacts of dense heat exchanging internals on gas holdup cross-sectional distributions and profiles of bubble column using gamma ray Computed Tomography (CT) for FT,
Chemical Engineering Journal, Vol 300, 317-333, (**2016**).
161. Gheni, S.A., Abdulaziz, Y.I., Al-Dahhan, M.H., Effect of L/D Ratio on Phase Holdup and Bubble Dynamics in Slurry Bubble Column using Optical Fiber Probe Measurements,
International Journal of Chemical Reactor Engineering, Vol 14, 2, 653-664, (**2016**).
160. Khane, V., Said, I.A., Al-Dahhan, M.H., Experimental investigation of pebble flow dynamics using radioactive particle tracking technique in a scaled-down Pebble Bed Modular Reactor (PBMR),
Nuclear Engineering and Design, Vol 302, 1-11, (**2016**).
159. Mohammed K. Al Mesfer, Abbas J. Sultan, Muthanna H. Al-Dahhan, Impacts of dense heat exchanging internals on gas holdup cross-sectional distributions and profiles of bubble column using gamma ray Computed Tomography (CT) for FT synthesis,
Chemical Engineering Journal, Vol 300, 317–333, (**2016**).
158. Rahman S. Abdulmohsin, Muthanna H. Al-Dahhan, Axial dispersion and mixing phenomena of the gas phase in a packed pebble-bed reactor,
Annals of Nuclear Energy, Vol 88, 100–11, (**2016**).
157. Mehul S. Vesvikar, Muthanna Al-Dahhan, Hydrodynamics investigation of laboratory-scale Internal Gas-lift loop anaerobic digester using non-invasive CARPT technique,
Biomass and Bioenergy, Vol 84, 98–106, (**2016**).
156. Muthanna H. Al-Dahhan, Trends in minimizing and treating industrial wastes for sustainable environment,
Procedia Engineering, Vol 138, 347–368, (**2016**).
155. M.S.Vesvikar and M. Al-Dahhan, Effect of scale on hydrodynamics of internal gas-lift loop reactor-type anaerobic digester using CFD,
Chemical product and process Modeling, Vol 10, 3, 179-192, (**2015**).
154. S.A. Gheni and M.H. Al-Dahhan, Assessing the feasibility of optical probe in phase holdup measurements and flow regime identification,
International Journal of Chemical Reactor Engineering, Vol 13, 3, 369-379, (**2015**).
153. Moses Kagumba and Muthanna Al-Dahhan, Impact of internals size and configuration on bubble dynamics for alternative clean fuels production,
I&EC Research, Vol 54, 4, 1359-1372, (**2015**).
152. Anuar Mohd Salleh, H. Koo Lee, M.H. Al-Dahhan, Studying local liquid velocity in liquid-solid packed bed using the newly developed X-ray DIR technique,
Flow Measurement and Instrumentation, Vol 42, 1-5, (**2015**).
151. Rahman S. Abdulmohsin and Muthanna Al-Dahhan, Characteristics of convective heat transport in a packed pebble-bed reactor using novel non-invasive heat transfer probe,
Nuclear Engineering and Design, vol. 284, 143-152, (**2015**).
150. Fadha Shakir Ahmed, Brent A. Sensenich, Saba A. Gheni, Bubble Dynamics in 2D Bubble Column: Comparison between High-Speed Camera Imaging Analysis and 4-Point Optical Probe,
Chemical Engineering Communications, Vol 202, 85–95, (**2015**).

149. Efhaima and M. H. Al-Dahhan, Local time-averaged gas holdup in fluidized bed reactor using gamma ray computed tomography technique (CT),
International Journal of Industrial Chemistry, Vol 6, 3, 143-152, (**2015**).
148. Albdiri Amer, Aastha Ojha and Muthanna Al-Dahhan, Study of local gas holdup and interfacial area in a split-column airlift bioreactor using sophisticated 4-point optical probe for culturing microalgae/cyanobacteria,
Chemical Engineering Communication, Vol 202, Issue 7, 892-898, (**2015**).
147. Muthanna H. Al-Dahhan, Overview of the role of catalytic multiphase reactors in “green” chemical manufacturing processes, “Movers & Shakers” Featured Profile,
The Catalyst Review, Vol 27, 2, (**2014**).
146. Khairul Anuar Mohd Salleh, Hyoung Koo Lee and Muthanna H. Al Dahhan, X-ray digital industrial radiography (DIR) for local liquid velocity (VLL) measurement in trickle bed reactors (TBRs),
Transactions of the American Nuclear Society, Vol 111, 518-519, (**2014**).
145. Mohd Salleh, Khairul; Lee, Hyoung; Al-Dahhan, Muthanna, Local liquid velocity measurement in trickle bed reactors (TBRs) using the x-ray digital industrial radiography (DIR) technique,
Measurement Science and Technology, Vol 25, 075401 (12pp), (**2014**).
144. Alwan, G. M., Aradhya, S.B, Al-Dahhan, M.H., Study of solids and gas distribution in spouted bed operated in stable and unstable conditions,
Int. Journal of Engineering Research and Applications, Vol 4, 1-6, (**2014**).
143. Muthanna Al-Dahhan, Shreekanta Aradhya, Faraj Zaid, Neven Ali and Thaar Aljuwayie, Scale-up and on-line monitoring of gas-solid systems using advanced and non-invasive measurement techniques,
Procedia Engineering, Elsevier, Vol 83, 469-476, (**2014**).
142. Yuan Zhou, M.P. Dudukovic, Hui Liu, and Muthanna Al-Dahhan, Multiphase hydrodynamics and distribution characteristics in a monolith bed measured by optical fiber probe,
AIChE Journal, Vol 60, No. 2, 740-748, (**2014**).
141. Youssef, A.A., Hamed, M.E., Al-Dahhan, M.H., Dudukovic, M.P., A New approach for scale-up of bubble column reactors,
Chemical Engineering Research and Design, Vol 92, 1637-1646, (**2014**).
140. Shaikh, A. and Al-Dahhan, M, Scale-up of bubble column reactors: A review of current state-of-the-art,
Industrial & Engineering Chemistry Research (I&EC Res.), Vol 52, 8091-8108, (**2013**).
139. Shaikh, A. and Al-Dahhan, M. H., A New Method for Online Flow Regime Monitoring in Bubble Column Reactors,
Chemical Engineering Science, Vol 89, 120-132, (**2013**).
138. Youssef, A.; Hamed, M.; Grimes, J.; Al-Dahhan, M.; and Dudukovic, M., Hydrodynamics of pilot scale bubble columns: Effect of internals,
Industrial and Engineering Chemistry Research, Vol 52, 43-55, (**2013**).
137. Youssef, A. A., Al-Dahhan, M. H., and Dudukovic, M.P., Bubble columns with internals: A review,
International Journal of Chemical Reactor Engineering, Vol 11, 169-223, (**2013**).
136. Nedeltchev, S., Aradhya, S., Zaid, F., Al-Dahhan, M., Flow regime identification in three multiphase reactors based on Kolmogorov entropies derived from gauge pressure fluctuations,
Journal of Chemical Engineering of Japan, Vol 45, 757-764, (**2012**).
135. Zhou, Y., Al-Dahhan, M., Dudukovic, M., Liu, H., Effect of distributor design on gas-liquid distribution in monolithic bed at high gas/liquid ratios,
Chinese Journal of Chemical Engineering, Vol 20, 693-700, (**2012**).
134. Abdulmohsin, R., Al-Dahhan, M., Impact of internals on the heat transfer coefficient in a bubble column,
Industrial & Engineering Chemistry Research, Vol 51, 2874-2881, (**2012**).
133. S. Nedeltchev, F. Ahmed and M. Al-Dahhan, A new method for flow regime identification in a fluidized bed based on gamma-ray densitometry and information entropy,
Journal of Chemical Engineering of Japan, Vol 45, 197-205, (**2012**).
132. Wu, C., Al-Dahhan, M., Heat transfer coefficients in mimicked Fischer-Tropsch slurry bubble columns,
Industrial and Engineering Chemistry Research, Vol 51,1543-1548, (**2012**).

131. Lan, X., Xu, C., Gao, J., Al-Dahhan, M., Influence of solid-phase wall boundary condition on CFD simulation of spouted beds,
Chemical Engineering Science, Vol 69, 419-430, (**2012**).
130. Kong, L.-N., Li, W., Han, L.-C., Liu, Y.-J., Luo, H.-A., Al-Dahhan, M., Dudukovic, M.P., On the measurement of gas holdup distribution near the region of impeller in a gas-liquid stirred Rushton tank by means of γ-CT,
Chemical Engineering Journal, Vol 188,191-198, (**2012**).
129. Luo, H.-P., Al-Dahhan, M.H., Airlift column photo bioreactors for porphyridium sp. culturing. Part I. Hydrodynamics, irradiance distribution and their impacts,
Biotechnology and Bioengineering, Vol 109, 932-941, (**2012**).
128. Luo, H.-P., Al-Dahhan, M.H., Airlift column photo bioreactors for porphyridium sp. culturing. Part II. Verification of dynamic growth rate model,
Biotechnology and Bioengineering, Vol 109, 942-949, (**2012**).
127. Luo, H.-P., Al-Dahhan, M.H., Verification and validation of CFD simulations for local flow dynamics in a draft tube airlift bioreactor,
Chemical Engineering Science, Vol 66, 907-923, (**2011**).
126. Liu, Y.-J., Li, W., Han, L.-C., Cao, Y., Luo, H.-A., Al-Dahhan, M., Dudukovic, M.P., γ-CT measurement and CFD simulation of cross section gas holdup distribution in a gas-liquid stirred standard Rushton tank,
Chemical Engineering Science, Vol 66, 3721-3731, (**2011**).
125. Rahman S. Abdulmohsin, Balasim A. Abid, Muthanna Al-Dahhan, Heat transfer study in a pilot-plant scale bubble column,
Chemical Engineering Research and Design Journal, Vol 89, 78-84, (**2011**).
124. Nedeltchev, A. Shaikh, M. Al-Dahhan, Flow regime identification in a bubble column via nuclear gauge densitometry and chaos analysis,
Chemical Engineering &Technology, Vol 34, 225-233, (**2011**).
123. H.-P. Luo, M. H. Al-Dahhan, Local gas holdup in a draft tube airlift bioreactor,
Chemical Engineering Science, Vol 65, 4503-4510, (**2010**).
122. Shaikh, A. and Al-Dahhan, M. H., A New Methodology for Hydrodynamic Similarity in Bubble Column Reactors,
Can. J. Chem. Eng. (Special Issue on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering), Invited Paper, vol. 88, 503-517, (**2010**).
121. Muthanna Al-Dahhan, Radioisotopes applications in industry: an overview,
Atoms for Peace - an International Journal, Vol 2, 324-337, (**2009**).
120. Youssef, Ahmed A.; Al-Dahhan, Muthanna H., Impact of Internals on the Gas Holdup and Bubble Properties of a Bubble Column,
Industrial & Engineering Chemistry Research, Vol 48, 8007-8013, (**2009**).
119. Ong, B. C.; Gupta, P.; Youssef, A.; Al-Dahhan, M.; Dudukovic, M. P., Computed Tomographic Investigation of the Influence of Gas Sparger Design on Gas Holdup Distribution in a Bubble Column,
Industrial & Engineering Chemistry Research, Vol 48, 58-68, (**2009**).
118. Kuzeljevic, Zeljko V.; van der Merwe, Werner; Al-Dahhan, Muthanna H.; Dudukovic, Milorad P.; Nicol, Willie, Effect of Operating Pressure on the Extent of Hysteresis in a Trickle Bed Reactor,
Industrial & Engineering Chemistry Research, Vol 47, 7593-7599, (**2008**).
117. Luo, Hu-Ping; Al-Dahhan, Muthanna H., Local characteristics of hydrodynamics in draft tube airlift bioreactor,
Chemical Engineering Science, Vol 63, 3057-3068, (**2008**).
116. A. Henriques, D. Johnston, M. Al-Dahhan, Enhancing water removal from whole stillage by enzyme addition during fermentation,
Cereal Chem., Vol 85, 685-688, (**2008**).
115. Huping Luo, Muthanna Al-Dahhan, Macro-Mixing in a draft tube airlift bioreactor,
Chemical Engineering Science, Vol 63, 1572-1585, (**2008**).
114. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde, Four Point optical Probe for measurement of bubble dynamics: validation of the technique,
Journal of Flow Measurement and Instrumentation (JFMI), Vol 19, 293-300, (**2008**).

113. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde, Bubble velocity, size, and interfacial area measurement in bubble column,
AIChE Journal, Vol 54, 350-363, (**2008**).
112. Chengtian Wu, Kelsey Suddard, Muthanna Al-Dahhan, Bubble dynamics investigation in a slurry bubble column,
AIChE Journal, Vol 54, 1203-1212, (**2008**).
111. Jing Guo, Y. Jiang, Muthanna Al-Dahhan, Modeling of trickle-bed reactors with exothermic reactions using cell network approach,
Chemical Engineering Science, Vol 63, 751-764, (**2008**).
110. Karim K., Hoffmann R., Al-Dahhan M., Digestion of sand-laden manure slurry in an upflow anaerobic solids removal (UASR) digester,
Biodegradation, Vol 19, 21-26, (**2008**).
109. Hoffmann R. A., Garcia M. L., Vesvikar M., Al-Dahhan M. H., Angenent L. T., Effect of shear on performance and microbial ecology of continuously stirred anaerobic digesters treating animal manure,
*Biotechnology and Bioengineering, Vol 100, 38-48, (***2008**).
108. Varma R., Bhusarapu S., O'Sullivan J. A., Al-Dahhan M. H., A comparison of alternating minimization and expectation maximization algorithms for single source gamma ray tomography,
Measurement Science and Technology, Vol 19, 015506, 14pp, (**2008**).
107. Werner van der Merwe, Willie Nicol, Muthanna Al-Dahhan, Effect of hydrodynamics multiplicity on Trickle Bed Reactor Performance,
AIChE Journal, Vol 54, 249-257, (**2008**).
106. Karim K, Klasson K. T., Drescher S., Ridenour W., Borole A., Al-Dahhan M. H., Mesophilic digestion kinetics of manure slurry,
Applied Biochemistry and Biotechnology, Vol 142, 231-242, (**2007**).
105. Guo J., David K., Al-Dahhan M., An internet-based distributed laboratory for interactive ChE education.
Chemical engineering education, Winter Issue, Vol 41, 24-30, (**2007**).
104. Han, Lu; Al-Dahhan, Muthanna H., Gas-liquid mass transfer in a high pressure bubble column reactor with different sparger designs,
Chemical Engineering Science, Vol 62, 131-139, (**2007**).
103. Chengtian Wu, Muthanna H. Al-Dahhan, and Anand Prakash, Heat transfer coefficients in a high-pressure bubble column,
Chemical engineering Science, Vol 62, 140-147, (**2007**).
102 Nedeltchev, S., Shaikh, A., Al-Dahhan, M., Prediction of the kolmogorov entropy derived from CT Data in a bubble column operated under the transition regime and ambient pressure,
Chemical Engineering Technology, Vol 30, 1445-1450, (**2007**).
101. Shaikh, Ashfaq, Al-Dahhan, Muthanna H., A review on flow regime transition in bubble columns,
International Journal of Chemical Reactor Engineering, MS#1368, Vol. 5 – R1, (**2007**).
100. Karim, Khursheed, Thoma, Gregory J., Al-Dahhan, Muthanna H., Gas-lift digester configuration effects on mixing effectiveness,
Water Research, Vol 41, 3051-3060, (**2007**).
99. Al-Dahhan, M. H., Kemoun, A., Cartolano, A. R., Roy, S., Dobson, R., Williams, J., Measuring gas-liquid distribution in a pilot scale monolith reactor via an Industrial Tomography Scanner (ITS),
Chemical Engineering Journal (Amsterdam, Netherlands), Vol 130, 147-152, (**2007**).
98. Bhusarapu, Satish, Cassanello, Miryan, Al-Dahhan, Muthanna H., Dudukovic, Milorad P., Trujillo, Steven, O'Hern, Timothy J., Dynamical features of the solid motion in gas-solid risers,
International Journal of Multiphase Flow, Vol 33, 164-181, (**2007**).
97. Mueller, Sean G., Werber, Jay R., Al-Dahhan, Muthanna H., Dudukovic, Milorad P., Using a Fiber-Optic Probe for the Measurement of Volumetric Expansion of Liquids,
Industrial & Engineering Chemistry Research, Vol 46, 4330-4334, (**2007**).
96. J. Guo, D. Kettler, and M. Al-Dahhan, A chemical engineering laboratory over distributed control and measurement systems,
Computer Applications in Engineering Education, Vol 15, 174-184, (**2007**).

95. J. Guo, D. Kettler, and M. Al-Dahhan, A web-based operated experiment for undergraduate engineering laboratory,
(Computer Application in Chemical Engineering Education), Published on-line – CACHE website, (**2007**).
94. Varma R., Al-Dahhan M., Effect of sparger design on hydrodynamics of a gas recirculation anaerobic bioreactor,
Biotechnology and Bioengineering, Vol 98, 1146-1160, (**2007**).
93. Vaishali S., Shantanu Roy, Satish Bhusarapu, M. H. Al-Dahhan, M. P. Dudukovic, Numerical simulation of gas-solid dynamics in a circulating fluidized bed riser with Geldart group B particles,
Ind. Eng., Chem., Res., Vol 46, 8620-8628, (**2007**).
92. Nedeltechev, S.; Shaikh, A.; and Al-Dahhan, M. H., Flow Regimes Identification in a Bubble Column Based on Both Statistical and Chaotic Parameters Applied to Computed Tomography Data,
Chemical Engineering and Technology, Vol 29, 1054-1060, (**2006**).
91. M. H. Al-Dahhan, A. Kemoun, R. Cartolano, Phase Distribution in an upflow monolith reactor using computed tomography,
AIChE Journal, Vol 52, 745-753, (**2006**).
90. Borole, A. P., Klasson, K. T., Ridenour, W., Holland, J., Karim, K., and Al-Dahhan, M. H., Methane Production in a 100-L Upflow Bioreactor by Anaerobic Digestion of Farm Waste,
Applied Biochemistry and Biotechnology, Vol 131, 887-896, (**2006**).
89. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković, Solids Flow Mapping in a Gas-Solid Riser: Velocity and Holdup Profiles,
Powder Technology, Vol 163, 98-123, (**2006**).
88. Al-Dahhan, M. H.; Mills, P. L.; Gupta, P.; Han, L.; Dudukovic, M. P.; Leib, T. M.; Lerou, J. J., Liquid-phase tracer responses in a cold-flow counter-current trayed bubble column from conductivity probe measurements,
Chemical Engineering and Processing, Vol 45, 945-953, (**2006**).
87. Jing Guo and Muthanna Al-Dahhan, Activity and Stability of Iron-Containing Pillared Clay Catalysts for Wet Air Oxidation of Phenol,
Applied Catalysis, Vol 299, 175-184, (**2006**).
86. Javier Alvare and Muthanna Al-Dahhan, Liquid Phase Mixing in Trayed Bubble Column Reactors,
Chemical engineering Science, Vol 61, 1819-1835, (**2006**).
85. Javier, Alvare, and Al-Dahhan, M. H., Gas holdup in trayed bubble columns.
I&EC Res., Vol 45, 3320-3326, (**2006**).
84. Rados, N., Shaikh, A., and Al-Dahhan, M. H., Solids Flow Mapping in High Pressure Slurry Bubble Columns using CARPT,
Chemical engineering Science, Vol 60, 6067-6072, (**2005**).
83. Mehul S Vesvikar, Rajneesh Varma, Khursheed Karim, Muthanna Al-Dahhan, Flow Pattern Visualization in a Mimic Anaerobic Digester: Experimental and Computational Studies,
Water Science and Technology, Vol 52, 537-543, (**2005**).
82. Karim K., Hoffmann R., Klasson K. T., Al-Dahhan M. H., Anaerobic digestion of animal waste: effect of mode of mixing,
Water Research, Vol 39, 3597-3606, (**2005**).
81. Karim, K., Hoffmann, R., Klasson, K.T., and Al-Dahhan, M.H., Anaerobic digestion of animal waste: Waste strength versus impact of mixing,
Bioresource Technology, 96, (16), 1771-1781, (**2005**).
80. Bauer, T., Guettel, R., Roy, S., Schubert, M., Al-Dahhan, M, Lange, R., Modeling and Simulation of the Monolithic Reactor for Gas-Liquid-Solid Reactions,
Chemical Engineering Research and Design, Vol 83, 811-819, (**2005**).
79. S. Roy, A. Kemoun, M.H. Al-Dahhan, M.P. Dudukovic, Experimental investigation of the hydrodynamics in a liquid-solid riser,
AIChE Journal, Vol 51, 802-835, (**2005**).
78. Shaikh, A. and Al-Dahhan, M.H., Characterization of hydrodynamic flow regime in bubble columns via computed tomography,

Flow Measurement and Instrumentation, Vol 16, 91-98 (Special Issue on Tomographic Techniques for Multiphase Flow Measurements), (**2005**).

77. Rados, N., M. Al-Dahhan, M.P. Dudukovic, Dynamic modeling of slurry bubble column reactors, *I&EC Res.,44, 16, 6086-6094 (Special issue for Professor M.P. Dudukovic)*
76. Bauer, T., S. Roy, R. Lange, M. Al-Dahhan, Liquid saturation and gas-liquid distribution in multiphase monolithic reactors, *Chemical engineering Science, Vol 60, 3101-3106,* (**2005**).
75. Khadilkar, M., M. Al-Dahhan, M.P. Dudukovic, Multicomponent flow-transport-reaction modeling of trickle bed reactors: application to unsteady state liquid flow modulation, *I&EC Res., Vol 44, 16, 6354-6370 (Special issue for Professor M.P. Dudukovic),* (**2005**).
74. Roy, S., A. Kemoun, M. Al-Dahhan, M.P. Dudukovic, T.B. Skourlis, F.M. Dautzenberg, Countercurrent flow distribution in structured packing via computed tomography, *Chem. Eng. and Processing, Vol 44, 59-69,* (**2005**).
73. Guo, J., Al-Dahhan, M., Modeling catalytic trickle-bed and up-flow packed-bed reactors for wet air oxidation of phenol with phase change, *Industrial and Engineering Chemistry Research, Vol 44, 6634-6642,* (**2005**).
72. Roy, S., Al-Dahhan, M., Flow distribution characteristics of a gas-liquid monolith reactor, *Catalysis Today, Vol 105, 396-400,* (**2005**).
71. Guo, J., Al-Dahhan, M., Catalytic wet air oxidation of phenol in co-current down-flow and upflow packed-bed reactors over pillared clay catalyst, *Chemical engineering Science, Vol 60, 735-746,* (**2005**).
70. Jiang, Y., Guo, J., Al-Dahhan, M., Multiphase flow packed bed reactor modeling: Combining CFD and cell network model, *Ind. Eng. Chem. Res., 44, 14, 4940-4948 (Special issue for Professor M.P. Dudukovic),* (**2005**).
69. Rados, N., Shaikh, A., Al-Dahhan, M.H., Phase distribution in a high pressure slurry bubble column via single source computed tomography, *Canadian Journal of Chemical Engineering, Vol 83, 104-112 (Special Issue on Industrial Process Tomography) Invited paper,* (**2005**).
68. Vesvikar, M.S., M. Al-Dahhan, Flow pattern visualization in a mimic anaerobic digester using CFD, *Biotechnology and Bioengineering, Vol 89, 719-732,* (**2005**).
67. Karim, K., Klasson, K.T., Hoffmann, R., Dresher, S.R., DePaoli, D.W. and Al-Dahhan, M.H., Anaerobic digestion of animal waste: Effect of mixing, *Bioresource Technology, Vol 96, 1607-1612,* (**2005**).
66. S. Bhusarapu, M. H. Al-Dahhan, M. P. Duduković, S. Trujillo and T.J. O'Hern, Experimental Study of the Solids Velocity Field in Gas-solid Risers, *Ind. & Eng. Chem. Res, Vol 44, 9739-9749,* (**2005**).
65. S Roy, A. Kemoun, M.H. Al-Dahhan and M.P. Dudukovic', Thomas B. Skourlis, Fritz M. Dautzenberg, Countercurrent flow distribution in structured packing via computed tomography, *Chemical Engineering and Processing, Vol 44, 59-69,* (**2004**).
64. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković, Quantification of Solids Flow in a Gas-Solid Riser: Single Radioactive Particle Tracking, *Chemical Engineering Science, Vol 59, 5381-5386,* (**2004**).
63. S. Bhusarapu, P. Fongarland, M. H. Al-Dahhan and M. P. Duduković, Measurement of Overall Solids Mass Flux in a Gas-Solid Circulating Fluidized Bed, *Powder Technology, Vol 148, 155-168,* (**2004**).
62. Angenent, L.T., Karim, K., Al-Dahhan, M.H., Wrenn, B.A., Domíguez-Espinosa, R., Production of bioenergy and biochemical from industrial and agricultural wastewater, *Trends in Biotechnology, Vol 22, 473-485,* (**2004**).
61. Bauer, T., Roy, S., Al-Dahhan, M., Lange, R., Untersuchungen zur Gas-Flüssig-Verteilung in Monolithreaktoren mittels Computertomographie (CT), *Chemie Ingenieur Technik. Vol 76, 1296,* (**2004**).
60. Guo J., Al-Dahhan M., Liquid Holdup and Pressure Drop in the Gas-liquid Cocurrent Down flow Packed-bed Reactor under Elevated Pressures. *Chemical engineering Science, Vol 59, 5387-5393*(**2004**).
59. Guo, J., Al-Dahhan, M., A sequential approach to modeling catalytic reactions in packed bed reactors,

Chemical engineering Science, Vol 59, 2023-2037, (**2004**).

58. Roy, Shaibal, T. Bauer, M. Al-Dahhan, P. Lehner, T. Turek, Monoliths as multiphase reactors: A review,
AIChE Journal, Vol 50, 2918-2938, (**2004**).
57. Karim, K., Varma, R., Vesvikar, M., and Al-Dahhan, M.H.), Flow pattern visualization of a simulated digester,
Water Res., Vol 38, 3659-3670, (**2004**).
56. Luo, H.-P., and Al-Dahhan, M.H., Analyzing and Modeling of Photo bioreactors by Combining First Principles of Physiology and Hydrodynamics,
Biotechnology and Bioengineering, Vol 85, 382-393, (**2004**).
55. Rados, N., M.H. Al-Dahhan, M.P. Dudukovic, Modeling of the Fischer-Tropsch Synthesis in Slurry Bubble Column Reactor,
Catalysis Today, Vol 79-80, 211-218, (**2003**).
54. Xue, J., M. Al-Dahhan, M.P. Dudukovic, R.F. Mudde, Bubble dynamics measurements using four-point optical probe,
Canadian J. of Chem. Eng., Vol 81, 375-381, (**2003**).
53. Shaikh, A., Al-Dahhan, M.H., Development of an artificial neural network correlation for prediction of overall gas holdup in bubble column reactors,
Chem. Eng. Proc., Vol 42, 599-610 (Special Issue on Application of Neural Networks to Multiphase Reactors), Invited Paper, (**2003**).
52. Luo, H.-P., Kemoun, A., Al-Dahhan, M.H., Fernandez, J.M., and Molina G.E., Analysis of photo bioreactor for culturing high value microalgae and cyanobacteria via an advanced diagnostic technique: CARPT,
Chemical engineering Science, Vol 58, 2519-2527, (**2003**).
51. Guo, J., Al-Dahhan, M., Catalytic wet oxidation of phenol by hydrogen peroxide over pillared clay catalyst,
Ind. Eng., Chem. Res., Vol 42, 2450-2460, (**2003**).
50. Guo, J., Al-Dahhan, M., Kinetics of wet air oxidation of phenol over a novel catalyst,
Ind. Eng. Chem. Res., Vol 42, 5473-5481, (**2003**).
49. Palmisano, E., Ramachandran, P.A., Balakrishnan, K., Al-Dahhan, M., Computation of effectiveness factors for partially wetted catalyst pellets using the method of fundamental solution,
Computers & Chemical Engineering, Vol 27, 1431-1411, (**2003**).
48. Wu, Y., Luo, X., Chen, W., Li, D., Li, S., Al-Dahhan, H., Dudukovic, M.P., Prediction of gas holdup in bubble columns using artificial neural network,
Chinese Journal of Chemical Engineering, Vol 11(2), 162-165, (**2003**).
47. Jiang, Y., Khadilkar, M.R., Al-Dahhan, M.H., Dudukovic, M.P, CFD of multiphase flow in packed-bed reactors: I. k-fluid modeling issues,
AIChE Journal, Vol 48, 701-715, (**2002**).
46. Jiang, Y., Khadilkar, M.R., Al-Dahhan, M.H., Dudukovic, M.P., CFD of multiphase flow in packed-bed reactors: II. Results and applications,
AIChE Journal, Vol 48, 716-730, (**2002**).
45. Roy, S., Larachi, F., Al-Dahhan, M.H., Dudukovic, M.P., Optimal design of radioactive particle tracking experiments for flow mapping in opaque multiphase reactors,
Applied Radiation and Isotopes, Vol 56, 485-503, (**2002**).
44. Rammohan, A. R., Kemoun, A., Al-Dahhan, M. H., Dudukovic M. P., and Larachi, F., CARPT dynamic bias studies: Evaluation of accuracy of position and velocity measurements.
Tracers and Tracing Methods, Leclerc, J. P., Ed., Vol 15, 59-67, (**2001**).
43. Jiang, Y.; Khadilkar, M. R.; Al-Dahhan, M. H.; Dudukovic, M. P., CFD modeling of multiphase flow distribution in catalytic packed bed reactors: scale down issues,
Catalysis Today, Vol 66, 209-218, (**2001**).
42. Rammohan, A. R.; Kemoun, A.; Al-Dahhan, M. H.; Dudukovic, M. P., Characterization of single phase flows in stirred tanks via computer automated radioactive particle tracking (CARPT),
Chemical Engineering Research and Design, Vol 79, 831-844, (**2001**).
41. Rammohan, A.R., Kemoun, A., Al-Dahhan, M.H., Dudukovic, M.P., A lagrangian description of flows in stirred tanks via computer-automated radioactive particle tracking (CARPT),

Chemical Engineering Science, Vol 56, 2629-2639, (**2001**).

40. Roy, S., Kemoun, A., Al-Dahhan, M.H., Dudukovic, M.P., A method for estimating the solids circulation rate in a closed-loop circulating fluidized bed,
Powder Technology, Vol 121, 213-222, (**2001**).
39. Wes Highfill and Muthanna Al-Dahhan, Liquid-solid mass transfer coefficient in high pressure trickle bed reactors,
Trans. IChemE, 79, 1-9, (**2001**).
38. Cassanello, M., F. Larachi, A. Kemoun, M.H. Al-Dahhan, M.P. Dudukovic, Inferring liquid chaotic dynamics in bubble columns using CARPT,
Chemical Engineering Science, Vol 56, 1-10, (**2001**).
37. Chen, J., N. Rados, M.H. Al-Dahhan, M.P. Dudukovic, Y. Nguyen, K. Parimi, Particle motion in packed/ebullated beds by CT and CARPT,
AIChE Journal, Vol 47, 994-1004, (**2001**).
36. Kemoun, A., N. Rados, M.H. Al-Dahhan, M.P. Dudukovic, P.L. Mills, T.M. Leib, J.J. Lerou, Gas holdup in a trayed cold-flow bubble column,
Chemical Engineering Science, Vol 56, 1197-1205, (**2001**).
35. P. Gupta, B.C. Ong, M.H. Al-Dahhan, M.P. Dudukovic, B.A. Toseland, Comparison of a single and two-bubble gas-liquid recirculation model: Application to pilot plant radioactive tracer studies during methanol synthesis,
Chemical Engineering Science, Vol 56, 1117-1126, (**2001**).
34. P. Gupta, B.C. Ong., M.H. Al-Dahhan, B.A. Toseland, Hydrodynamics of churn-turbulent bubble columns: gas-liquid recirculation and mechanistic modeling,
Catalysis Today Journal, Vol 64, 253-269, (**2001**).
33. Y. Wu, M.H. Al-Dahhan, Prediction of axial liquid velocity profile in bubble columns,
Chemical Engineering Science, Vol 56, 1127-1130, (**2001**).
32. D. Tsamatsoulis, M.H. Al-Dahhan, F. Larachi, N. Papayannokos, The effect of particle dilution on wetting efficiency and liquid film thickness in small trickle beds,
Chem. Eng. Communication, 185, 67-77, (**2001**).
31. Kemoun, B.C. Ong., P. Gupta, M.H. Al-Dahhan, M.P. Dudukovic, Gas holdup in bubble columns at elevated pressure via computed tomography,
Int. J. of Multiphase Flow (IJMF), Vol 27, 929-946, (**2001**).
30. Y. Jiang, Muthanna H. Al-Dahhan, M.P. Dudukovic, Statistical characterization of macroscale multiphase flow textures in trickle beds,
Chemical Engineering Science, Vol 56, 1647-1656, (**2001**).
29. Y. Wu, Boon Cheng Ong, Muthanna H. Al-Dahhan, Prediction of radial gas hold-up profiles in bubble column reactors,
Chemical Engineering Science, Vol 56, 1207-1210, (**2001**).
28. Iliuta, F. Larachi, Muthanna H. Al-Dahhan, Multiphase-zone model for partially wetted trickle flow hydrodynamics,
Trans. IChemE, Vol 78a, 982-990, (**2000**).
27. Muthanna H. Al-Dahhan, Wes Highfill, Boon Tee Ong, Drawbacks of the dissolution method for measurement of the liquid-solid mass transfer coefficients in two-phase flow packed-bed reactors operated at low and high pressures,
Ind. Eng. Chem. Res., Vol 39(8), 3102-3107, (**2000**).
26. Iliuta, F. Larachi, Muthanna H. Al-Dahhan, Double-slit model for partially wetted trickle flow hydrodynamics,
AIChE Journal, Vol 46, 597-609, (**2000**).
25. F. Larachi, I. Iliuta, Muthanna H. Al-Dahhan, M.P. Dudukovic, Discriminatory trickle flow hydrodynamic models: some recommendations,
I&EC Research, Vol 39, 554-556, (**2000**).
24. Y. Jiang, M.R. Khadilkar, Muthanna H. Al-Dahhan, M.P. Dudukovic, Single phase flow modeling in packed beds: discrete cell approach revisited,
Chemical Engineering Science, Vol 55, 1829-1844, (**2000**).
23. P. Gupta, Muthanna H. Al-Dahhan, M.P. Dudukovic, P.L. Mills, A novel signal filtering methodology for obtaining liquid phase tracer responses from conductivity probes,
Flow Measurement and Instrumentation J., Vol 11, 123-131, (**2000**).

22. M. H. Al-Dahhan, W. Highfill, Liquid holdup measurement techniques in laboratory high pressure trickle bed reactors,
Canadian Journal of Chemical Engineering, Vol 77, 759-765, **(1999)**.
21. M. R. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, Parametric study of unsteady state flow modulation in trickle bed reactors,
Chemical Engineering Science, Vol 54, 2585-2595, **(1999)**.
20. Y. Jiang, M. R. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, Two phase flow distribution in 2d trickle-bed reactors,
Chemical Engineering Science, Vol 54, 2409-2419, **(1999)**.
19. Chen, F. Li, S. Degaleesan, P. Gupta, M. H. Al-Dahhan, M. P. Dudukovic, B. Toseland, Fluid dynamic parameters in bubble columns with internals,
Chemical Engineering Science, Vol 54, 2187-2197, **(1999)**.
18. Chen, A. Kemoun, M. H. Al-Dahhan, M. P. Dudukovic, D. J. lee, L.-S. Fan, Comparative hydrodynamics study in a bubble column using computer automated radioactive particle tracking (CARPT) / computed tomography (CT) and particle image velocimetry (PIV),
Chemical Engineering Science, Vol 54, 2199-2207, **(1999)**.
17. H. Al-Dahhan, M. R. Khadilkar, Y. Wu, M. P. Dudukovic, Prediction of pressure drop and liquid holdup in high pressure trickle bed reactors,
Ind. & Eng. Chem. Res., 37, 793 (Special issue in honor of Professor Westerterp), **(1998)**.
16. Khadilkar, M. H. Al-Dahhan, Y. Jiang, M. P. Dudukovic, S.K. Chou, G. Ahmed, R. Kahney, Investigation of a complex reaction network for production of amino-alcohol: I. experimental observations in high pressure trickle-bed reactor,
AIChE Journal, Vol 44, 912, **(1998)**.
15. R. Khadilkar, M. H. Al-Dahhan, Y. Jiang, M. P. Dudukovic, S.K. Chou, G. Ahmed, R. Kahney, Investigation of a complex reaction network for production of amino-alcohol: II. Kinetics, mechanism and model based parameter estimation,
AIChE Journal, Vol 44, 921, **(1998)**.
14. Jinwen Chen, Puneet Gupta, Sujatha Degaleesan, Muthanna Al-Dahhan, Milorad P. Dudukovic, Bernard Toseland, Gas holdup distribution in large bubble columns measured by computed tomography,
Flow Measurement and Instrumentation Journal, Vol 9, 190-101, **(1998)**.
13. M. H. Al-Dahhan, F. Larachi, M. P. Dudukovic, A. Laurent, High pressure trickle-bed reactors: a review,
Ind. & Eng. Chem. Res., (Special issue in honor of Professor Froment), 36, 3292-3314, **(1997)**.
12. M. H. Al-Dahhan, S. Highfill, M. Freidman, Assessment of the effects of high pressure operation on the liquid-solid mass transfer coefficient in trickle-bed reactors,
Ind. & Eng. Chem. Res., 36, 4421-4426, **(1997)**.
11. S. Roy, J. Chen, S. Kumar, M. H. Al-Dahhan, M. P. Dudukovic, Tomographic and particle tracking studies in a liquid-solid riser,
Ind. & Eng. Chem. Res., Vol 36, 4666, **(1997)**.
10. Muthanna H. Al-Dahhan and Charles E. Wicks, Influence of mixing intensity on the mass transfer coefficient across liquid-liquid interfaces,
Chem. Eng. Comm., Vol 145, 213-227, **(1996)**.
9. Muthanna H. Al-Dahhan and M. P. Dudukovic, Catalyst bed dilution for improving catalyst wetting in laboratory trickle-bed reactors,
AIChE Journal, Vol 42, 2594-2606, **(1996)**.
8. Y. Wu, M. Khadilkar, M. Al-Dahhan, M. Dudukovic, Comparison of upflow and down flow two phase flow reactors with and without fines: Experimental observations,
Ind. & Eng. Chem. Res., Vol 35, 397-405, **(1996)**.
7. Khadilkar, M. R., Y. X. Wu, M. H. Al-Dahhan, M. P. Dudukovic, and M. Colakyan, Comparison of trickle-bed and upflow reactor performance at high pressure: model predictions and experimental observations,
Chemical Engineering Science, Vol 51, 2139-2148, **(1996)**.
6. Wu, Y. X., M. H. Al-Dahhan, M. R. Khadilkar and M. P. Dudukovic, Evaluation of trickle-bed reactor models for a liquid limited reaction,
Chemical Engineering Science, Vol 51, 2721-2725, **(1996)**.

5. Muthanna H. Al-Dahhan and Charles E. Wicks, Modified contactor for experimental studies of mass transfer and chemical reaction across liquid-liquid interface, *Ind. & Eng. Chem. Res., Vol 35, 3812-3816,* **(1996)**.
4. Muthanna H. Al-Dahhan, Yuanxin Wu, and Milorad P. Dudukovic, Reproducible technique for packing laboratory-scale trickle-bed reactors with a mixture of catalyst and fines, *Ind. & Eng. Chem. Res., Vol 34, 741-747,* **(1995)**.
3. Muthanna H. Al-Dahhan and Milorad P. Dudukovic, Catalyst wetting efficiency in trickle-bed reactors at high pressure, *Chemical Engineering Science, Vol 50, 2377-2389,* **(1995)**.
2. Muthanna H. Al-Dahhan, Computing in the undergraduate chemical engineering curriculum: An integrated approach, *Chem. Eng. Educt., Vol. 29, 3, 198,* **(1995)**.
1. Muthanna H. Al-Dahhan and Milorad P. Dudukovic, Pressure drop and liquid holdup in high pressure trickle-bed reactors, *Chemical Engineering Science, Vol 49, 5681-5698,* **(1994)**.

Contributions to Chapters

- Catalytic Process R&D Scale-up: Challenges and Issues, The Catalyst Group Resources, Inc., A technical investigation commissioned by the members of the Catalytic Advances Program, (Dr. Muthanna Al Dahhan, Dr. Cawas Cooper, Dr. Dmitry Murzin, Dr. Vishwas Pangarkar, Mr. John Allen Rudesill, Dr. Tapio Salmi), November **(2009)**

  Two Sub-Chapters of Chapter 3: Sale-up: Pilot Scale to Commercial Reactor
  i. 3.2. Scale-up of Trickle Bed Reactor (TBR)
     (Muthanna Al-Dahhan and Cawas Cooper)
  ii. 3.3. Scale-up of Gas-Solid Fluidized Bed Reactor (FBR)
     (Muthanna Al-Dahhan and Cawas Cooper)
- Chapter 27 in Professor Levenspiel Textbook - OmniBook
  My work on modeling and analysis of gas-solid monolithic and plate reactors has constituted Chapter 27th in the textbook of the Chemical Reactor OmniBook of Professor Octave Levenspiel, (Chapter 27. Tube Wall, Monolith and Plate Catalytic Reactors), July **(2002)**, ISBN-0-88246-173-7 (see below the hand-written and signature acknowledgment of Professor Levenspiel)

Other Non-Reviewed Contribution to the Literature

Ghanim Maqbool, Muthanna Al-Dahhan, Farooq A. Mehdi**,** Multi-Objective Optimization of A Spouted Bed Reactor: Improving the Stability and Operability
Lambert Academic publishing GmbH Co. k G, ISBN: 978-3-8473-4024-9, **(2012)**

Peer Reviewed Proceedings publications

78. Salman M Alshehri, Ibrahim A. Said, Muthanna H. Al-Dahhan, Shoaib Usman (2018), Plenum-Plenum Natural Circulation Heat Transfer in a Prismatic Very-High Temperature Reactor for Different Coolants, The Advances in Thermal Hydraulics, Transaction of the American Nuclear, Society (ANS), Winter Meeting, 2018, USA, Orlando
77. Salman M Alshehri, Ibrahim A. Said, Muthanna H. Al-Dahhan, Shoaib Usman (2018), Experimental Investigation on Heat Transfer in a Prismatic Modular Reactor under Cosine Heat Flux, The Advances in Thermal Hydraulics, Transaction of the American Nuclear Society (ANS), Winter Meeting 2018, USA, Orlando
76. Salman Alshehri, I.A. Said, Muthanna Al-Dahhan, Shoaib Usman (2018), Experimental Investigation of Plenum-to-Plenum Natural Circulation Heat Transfer in a Prismatic Very High-Temperature Reactor, Transaction of the American Nuclear Society (ANS), Annual Meeting, 2018, USA, Philadelphia
75. Salman Alshehri, I.A. Said, Muthanna Al-Dahhan, Shoaib Usman (2018), Experimental Investigation on Heat Transfer Characteristics with Non-Uniform Heat Flux Distribution under Natural Circulation, Transaction of the American Nuclear Society (ANS), Annual Meeting, 2018, USA, Philadelphia

74. Thaar Al-Juwaya, Neven Ali, Muthanna Al-Dahhan (2017), Experimental Investigation of Solid Particles Flow in TRISO Spouted Bed Coaters with Binary Mixtures of Particles Using RPT, Transaction of the American Nuclear Society (ANS), Washington, DC, Winter meeting, October 29-November 2, 2017
73. Laith S Sabri, Abbas J Sultan, Muthanna H Al-Dahhan, (2017), Assessment of RPT calibration need during microalgae culturing and other biochemical processes, Environmental Impacts of the Oil and Gas Industries: Kurdistan Region of Iraq as a Case Study (EIOGI), IEEE, 59-64
72. Mohammed HS Zangana, Fakhri H Ibraheem, Srwa I Khaleel, Muthanna H Al-Dahhan, (2017), Recycling of spent molecular sieves from oil and gas industry: North gas company as a case study, Environmental Impacts of the Oil and Gas Industries: Kurdistan Region of Iraq as a Case Study (EIOGI), IEEE, 54-58
71. M.T. Kao, P. J., S. Usman, I.A. Said, M.M. Taha, M.H. Al-Dahhan, and Rizwan-Uddin (2015) Investigation of Plenum-to-Plenum Heat Transfer and Gas Dynamics under Natural Circulation in a Scaled-Down Dual Channel Module Mimicking Prismatic VHTR core using CFD, Proceedings of the 16th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-16), Aug 30-Sept 4, 2015 Hyatt Regency Chicago, IL
70. M. M. Kao, Rizwan-Uddin, S. Usman, P. Jain, I. A. Said, M. M. Taha, Muthanna Al-Dahhan (2015) Investigation of Plenum-to-Plenum Heat Transfer and Gas Dynamics under Natural Circulation in a Scaled Down Dual Channel Module Mimicking Prismatic VHTR core with using CFD, American Nuclear Society (ANS) (in Transaction), Nuclear Thermal Hydraulic, Chicago, August 30 – September 1
69. Neven Yousif Ali, Thaar M. Aljuwaya, Muthanna H. Al-Dahhan (2015) Detailed 3D Solids Dynamics of Gas-Solid Spouted Beds Using Gamma Ray Computed Tomography (CT) and Radioactive Particle Tracking (RPT) Techniques, American Nuclear Society, San Antonio, TX, June 7-11, 2015 (in transaction)
68. Neven Ali, Thaar Al-Juwaya, Muthanna Al-Dahhan (2014) Advance the Understanding of the Phases' Distribution of TRISO Fuel Coater using Gamma Ray Computed Tomography (CT), American Nuclear Society, Reno, NV, June 15-19
67. Shreekanta B. Aradhya and Muthanna H. Al-Dahhan (2014) New scale-up methodology for gas-solid spouted beds based on maintaining similar hydrodynamic profiles, International Symposium on Chemical Reaction Engineering (ISCRE 23) and Asia Pacific Chemical Reaction Engineering (APCRE 7), Bangkok, Thailand, September 7-10
66. Rahman Abdulmohsin and Muthanna H. Al-Dahhan (2014) Characteristics of Convective Heat Transfer in a Packed Pebble-bed Reactor Using Novel Fast-response and Noninvasive Heat Transfer Probe of Spherical Shape. International Symposium on Chemical Reaction Engineering (ISCRE 23) and Asia Pacific Chemical Reaction Engineering (APCRE 7), Bangkok, Thailand, September 7-10
65. Moses Kagumba and Muthanna Al-Dahhan (2014) Combined Heat Transfer and Bubble Dynamics: A Mechanistic Approach, ISCRE 23 and APCRE 7, Bangkok, Thailand, September 7-10
64. Hyoung Koo Lee, Khairul Anuar Mohd Salleh, Muthanna H. Al-Dahhan (2014) X-ray Digital Industrial Radiography (DIR) and Particle Tracking Velocimetry (PTV) for Local Liquid Velocity (VLL) measurement in Trickle Bed Reactors (TBRs), Transaction of American Nuclear Society, Winter
63. Khairul Anuar Mohd Salleh, Hyoung Koo Lee, Muthanna H. Al-Dahhan (2013), New local liquid velocity measurement technique in Trickle Bed Reactors (TBRs) using X-ray Digital Industrial Radiography and Particle Tracking (DRPT) techniques, 9444, 2013 American Nuclear Society Winter Meeting and Nuclear Technology Expo, Washington, DC, November 10-14, 2013.
62. Rahman Shnain Abdulmohsin, Muthanna H. Al-Dahhan (2013) Characteristics of Flow and Convective Heat Transfer in a Packed Pebble-Bed Reactor, Transaction of the American Nuclear Society Vol. 109, Washington, D.C., November 10-14
61. Neven Y. Ali, Thaar Mohammad Al-Juwaya, Muthanna Al-Dahhan (2013) Effects of operating and design variables on the phases' distribution using Gamma Ray Computed Tomography

(CT) of spouted beds for coating TRISO nuclear fuel particles, Transaction of the American Nuclear Society, Vol. 109, 378-381, Washington, DC, November 10-14

60. Vaibhav Khane, Muthanna H. Al-Dahhan (2013) Experimental and Computational Study of Slow and Dense Granular Flow in a Pebble Bed Reactor, 8980, Transaction of the American Nuclear Society, Vol. 109, 506-608, Washington, DC, November 10-14
59. Khairul Anuar Mohd Salleh, Hyoung Koo Lee, Muthanna H. Al-Dahhan (2013), New local liquid velocity measurement technique in Trickle Bed Reactors (TBRs) using X-ray Digital Industrial Radiography and Particle Tracking (DRPT) Techniques, Transaction of the American Nuclear Society, Vol. 109, 515-516, Washington, D.C., November 10-14
58. Rahman S. Abdulmohsina and Muthanna H. Al-Dahhan, (2012), Characteristics of Heat Transfer in a Packed Pebble-Bed Reactor, Transactions/Proceeding of American Nuclear Society (ANS) Winter meeting, Vol.107, pp. 1330-1332, San Diego, CA, November 11 -15
57. Vaibhav Khane and Muthanna H. Al-Dahhan, (2012), Study of Pebbles Residence Time Distributions in a Pebble Bed Test Reactor, Transactions/Proceeding of American Nuclear Society (ANS) Winter meeting, Vol.107, pp. 860-861, San Diego, CA, November 11 -15
56. Vaibhav Khane, Sfurti Ruge, and Muthanna H. Al-Dahhan, (2012), Development of Cross-Correlation Based Position Reconstruction Algorithm for Radioactive Particle Tracking Technique, Transactions/Proceeding of American Nuclear Society (ANS) Winter meeting, Vol.107, pp. 362-364, San Diego, CA, November 11 -15
55. Mehul Vesvikar, Muthanna Al-Dahhan, (2012), Development, validation and implementation of multiple radioactive particle tracking (MRPT), Proceeding of 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
54. Fadha Ahmed, Mohammed Al-Mesfer, Muthanna Al-Dahhan, (2012), Bed structure characterization of pebble bed reactor using gamma ray tomography, Proceeding of 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
53. P. A. S. Vasquez, R. Varma, M. M. Hamada, C. Henrique De Mesquita, M. H. Al-Dahhan, (2012), Image reconstruction algorithms applied to polyenergetic gamma ray tomography for large systems, Proceeding of 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
52. Mohammed Al-Mesfer, Fadha Ahmed, P. Neogi, Muthanna Al-Dahhan, (2012), Effect of Internals on gas holdup in bubble columns using computed tomography (CT), Proceeding of 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
51. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2012), Study of solids dynamics in moving bed reactor using radioactive particle tracking (RPT) technique, Proceeding of 6th International Symposium on Process Tomography, Cape Town, South Africa, March 26-28
50. Shreekanta Aradhya, Muthanna Al-Dahhan, (2012), A New methodology for optical probe calibration and validation with computed tomography in spouted beds, Proceeding of 6th International Symposium on Process Tomography, Cape Town, South Africa, March 26-28
49. S. Nedeltchev, F. Ahmed, A. Shaikh and M. Al-Dahhan, (2012), Effect of scintillation detector position on flow regime boundaries in different multiphase reactors based on information entropy, Nuclear Gauge Densitometry and Computed Tomography Scans, Proceeding of 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
48. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2012), Discrete element method based simulation of pebble bed test reactor, Transactions/Proceeding of American Nuclear Society (ANS) Winter meeting, Vol. 105, pp.706-707, Washington D.C., Oct.30th - Nov.3rd
47. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2011), Pebble bed reactor as static packed bed, Transactions/Proceeding of American Nuclear Society (ANS) Winter Meeting, Vol. 105, pp.704-705, Washington D.C., Oct.30th - Nov.3rd
46. Herbig, T. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2011), Determination of interaction parameters for EDEM based simulations of pebble bed test reactor, Transactions/Proceeding of American Nuclear Society (ANS) Winter Meeting, Vol. 105, pp.701-702, Washington D.C., Oct.30th - Nov.3rd
45. Faraj Zaid, Stoyan Nedeltchev and Muthanna H. Al-Dahhan, Regime transitions in a fluidized bed based on analyses of gauge pressure fluctuations, (2011), Proceeding of American Nuclear Society (ANS) Annual Meeting, Hollywood, Florida, USA, June 26-30

44. Abdulmohsin, R., and Al-Dahhan, M., (2011), Axial gas dispersion and heat transfer coefficient in a pebble bed reactor, Proceeding of American Nuclear Society (ANS) Winter Meeting and Nuclear Technology Expo, Washington, DC, USA, Oct.30th - Nov.3rd
43. Abdulmohsin, R., Al-Dahhan, M., (2011), Axial gas dispersion in a pebble bed reactor: effect of pebble size, Proceeding of American Nuclear Society (ANS) Annual Meeting, Hollywood, Florida, USA, June 26-30
42. Abdulmohsin, R., Ali, N., Al-Dahhan, M., (2011), Heat transfer coefficient in a pebble bed reactor (PBR), Proceeding of American Nuclear Society (ANS) Annual Meeting, Hollywood, Florida, USA, June 26-30
41. Shreekanta Aradhya, Muthanna Al-Dahhan, (2011), Assessing the scale-up methodology based on dimensional analysis for spouted beds – a comparison between optical probes and CFD", Proceeding of American Nuclear Society (ANS) Annual Meeting, Hollywood, Florida, USA, June 26-30
40. Vaibhav B. Khane, Rahman Abdulmohsin, Muthanna Al-Dahhan, (2010), Study of solids dynamics in PBR using radioactive particle tracking techniques, Proceeding of 2010 winter meeting of American Nuclear Society, Vol. 103, pp.193-194, Isotopes and Radiation: General, November 7-11, 2010, Las Vegas, Nevada
39. Xinging Lan, Shrekanta Aradhya, Ahmed Fadha, Muthanna Al-Dahhan, (2010), CFD evaluation of dimensionless groups approach for spouted beds scale-up, Proceeding of 2010 winter meeting of American Nuclear Society, page 888, Experimental and CFD Analysis of Gen-IV reactors - I, November 7-11, 2010, Las Vegas, Nevada
38. Rahman S. Abdulmohsin, Muthanna Al-Dahhan, (2010), Gas dispersion in a very high temperature pebble bed reactor (PBR), Proceeding of 2010 winter meeting of American Nuclear Society, page 891, Experimental and CFD Analysis of Gen-IV reactors - I, November 7-11, 2010, Las Vegas, Nevada
37. Chengtian Wu and Muthanna Al-Dahhan, (2010), Heat transfer coefficients in bubble column, 5th international Conference on Thermal Engineering: Theory and Applications, Marrakesh, Morocco, May 10-14
36. Muthanna Al-Dahhan, (2008), Radioisotopes applications in petrochemical industry: an overview, Proceeding of the International Symposium on the Peaceful Applications of Nuclear Technology in the Gulf Cooperation Council (GCC) Countries, Jeddah, Saudi Arabia, November 3-7, 2008
35. S. Bhusarapu, M. H. Al-Dahhan, M. P. Dudukovic, (2008) Quantification of solids mixing in gas-solid riser, Proceeding in 9th international Conference on Circulating Fluidized Beds, May 13-16, Hamburg, Germany
34. R. Varma, J.A. O'Sullivan, M.H. Al-Dahhan, (2007), Application of alternating minimization (CAM) in dual source gamma ray computer tomography for imaging three phase systems, Proceeding of 5th World Congress on Industrial Process Tomography, September 3-6, Bergen, Norway
33. A. Shaikh, M.H. Al-Dahhan, (2007), On-line flow regime monitoring in bubble columns via nuclear gauge densitometry, Proceedings of 5th World Congress on Industrial Process Tomography, September 3-6, Bergen, Norway
32. S. Vaishali, S. Bhusarapu, s. Roy, M.H. Al-Dahhan, M.P. Dudukovic (2007), Numerical Simulation of Gas-Solid Dynamics in Circulating Fluidized bed riser with Geldart Group B Particles, Proceeding of CAMURA-2007
31. T. Bauer, S. Haase, M. H. Al-Dahhan, R. Lange, (2007), Performance of monolithic and sphere-packed monolithic reactors, Proceeding of 8th Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS8), December, New Delhi, India
30. Guo J., David K., Al-Dahhan M. (2006), A Client-Server Architecture for Distributed Control and Measurement Systems, Proceeding of the 9th International Conference on Engineering Education, T1E-18-29, San Juan, PR
29. M. Al-Dahhan, C. Carpenter, N. Nissing (2006), Integrating Practice into Engineering Education-The Role of Adjunct Faculty and Industrial Mentor Program, T130-34, Proceeding of the 9th International Conference on Engineering Education, T1E-18-29, San Juan, PR
28. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde, (2005), Bubble velocity, size, and interfacial area measurements in bubble columns using four-point optical probe, 5th

International Symposium on Catalysis in Multiphase Reactors (CAMURE-5) and 4th International Symposium on multifunctional Reactors, Portorose, Slovenia, June 15-18, 217-218

27. A. Kemoun, S. Roy, M.H. Al-Dahhan, A.R. Cartolano, R. Dobson, J. Williams, (2005), Study of Gas-Liquid Distribution in a Pilot Scale Monolith Reactor via Industrial Tomography Scanner (ITS), 4th World Congress on Industrial Tomography, Aizu, Japan, September 5-8, 1, 220-225
26. Shaikh, A. and Al-Dahhan, M. H., (2005), Identification of Hydrodynamic Flow Regime in Bubble Columns via Computed Tomography, 4th World Congress on Industrial Tomography, Aizu, Japan, September 5-8,2, 752-757
25. Bauer, T., Guettel, R., Roy, S., Schubert, M., Al-Dahhan, M, Lange, R., (2005), Modeling and Simulation of the Monolithic Reactor for Gas-Liquid-Solid Reactions, Proceedings of the WCCE7, Glasgow, Scotland, UK, July 10-14
24. Bhusarapu, S., M. H. Al-Dahhan and M. P. Duduković, (2005), Solids Flow Mapping in a Gas-Solid Riser: Mean Holdup and Velocity Fields, Proceeding of the 7th World Congress of Chemical Engineering (WCCE7), Glasgow, United Kingdom, July 10-14
23. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković, (2005), Application of an Alternating Minimization Algorithm for Image Reconstruction in Computed Tomography, 4th World Congress on Industrial Tomography, Aizu, Japan, September 5-8, 2, 960-964
22. S. Roy and M.H. Al-Dahhan, (2005), Flow Distribution Characteristics of a Gas-Liquid Monolith Reactor using Computed Tomography, proceedings of the 4th World Congress on Industrial Tomography, Aizu, Japan, September 5-8, 1, 446-451
21. S. Roy and M.H. Al-Dahhan (2005), Flow Distribution in Monolith using Computed Tomography, accepted in the proceedings of the 2nd International Conference on Structured Catalysts and Reactors, Delft, the Netherlands, Oct. 16-19
20. S. Roy and M.H. Al-Dahhan, (2005), Effect of Flow Maldistribution on Multiphase Monolith Reactor Performance, accepted in the proceedings of the 2nd International Conference on Structured Catalysts and Reactors, Delft, the Netherlands, Oct. 16-19
19. S. Antal, R. L. Lahey, M.H. Al-Dahhan, (2004), Modeling Churn Turbulent flows in a slurry/bubble column with a three field model of two phase flow, Proceedings of the 5th International Conference on Multiphase Flow (ICMF-2004), Yokohama, Japan, May 30-June 2004
18. R. Hoffman, R. Varma, M. Vesvikar, K. Karim, M. H. Al-Dahhan and L. T. Angenent, (2004), Effect of shear rate on hydrodynamics, performance, and microbial community dynamics for an anaerobic digester treating cow waste, Anaerobic Digestion 2004 Proceedings, the 10th World Congress on Anaerobic Digestion, Vol. 3, pp1755
17. Vesvikar, M.S., Varma, R., Karim, K., and Al-Dahhan, M.H., (2004), Flow pattern visualization in a mimic anaerobic digester: Experimental and computational studies, proceedings of the 10th World congress – Anaerobic Digestion, Anaerobic Bioconversion for Sustainability, August 29th – September 2nd, Montreal, Canada
16. Shaikh, A.; Rados, N.; Al-Dahhan, M. H., (2003), Phase Distribution in a High Pressure Slurry Bubble Column via Computed Tomography, Proceedings of 3rd world Congress on Industrial Tomography, Banff, Canada, pp. 121
15. S. Roy, A. Kemoun, M.H. Al-Dahhan and M.P. Dudukovic', Thomas B. Skourlis, Fritz M. Dautzenberg, (2003), Flow distribution in counter-current flow structured packing bed via computed tomography, Proceedings of the 3rd World Congress on Industrial Process Tomography, September 2-5, Banff, Canada
14. N. Rados, A. Kemoun, M.H. Al-Dahhan, (2002), Implementation of Advanced Diagnostic Techniques for Flow Visualization and Tomography in High Pressure Slurry Bubble Column Reactor, Ed. A. Bertucco, vol. 2, pp 937-941, Proceedings of the 4th Int. Symposium on High Pressure Technology and Chemical Engineering, Venice, Italy, Sep. 22-25
13. M.H. Al-Dahhan, (2002), Flow Visualization of Multiphase Flow Systems, Conference Proceedings, vol. 2, page 661, The 6th Saudi Engineering Conference, December 14-17
12. M.H. Al-Dahhan, (2002), Integrated Approach of Computing and Computer Applications at an Early Stage of Undergraduate Engineering Program, Conference Proceedings, vol. 4, page 119, The 6th Saudi Engineering Conference, December 14-17

11. Muthanna Al-Dahhan, (2001), Hydrodynamics of bubble column via advanced diagnostic techniques", 1st International Chemical Engineering Conference Proceeding, Amman, September 2001, Jordan
10. Muthanna Al-Dahhan, (2001), What undergraduate chemical engineering students should know regarding computing and computer applications", 1st International Chemical Engineering Conference Proceedings, September 2001, Amman, Jordan
9. M. Rafique, M.H. Al-Dahhan, M.P. Dudukovic, (2001), The effect of different closures on the dynamics of bubble column flows", 1st International Chemical Engineering Conference Proceeding, September 2001, Amman, Jordan
8. Gupta, P., M.H. Al-Dahhan, M.P. Dudukovic, P.L. Mills, T.M. Leib, J.J. Lerou, (2001), Liquid-phase tracer responses in a cold-flow trayed bubble column from conductivity probe measurements", Gas-Liquid Solid Topical Conference Proceeding, 6th World Congress of Chemical Engineering, September 2001, Melbourne, Australia
7. S. Roy, F. Larachi, M.H. Al-Dahhan, M.P. Dudukovic, (2001), Resolution And Sensitivity In Computer Automated Radioactive Particle Tracking (CARPT), Proc. SPIE, The International Society for Optical Engineering, vol. 4188, 122-133, (2001), Process imaging for automatic control, SPIE, Int. Symposium on Intelligent Systems for Advanced Manufacturing, (Boston, Nov. 5-8, 2000)
6. Muthanna H. Al-Dahhan, (2000), Integration of design and selected process engineering components into the unit operations laboratory, 2000 ASEE Proceedings (Refereed paper in proceedings), S-2559
5. Muthanna H. Al-Dahhan, Steve Picker, Christina Weigand, Amy Chen, (2000), Development of a biochemical experiment for the unit operations laboratory through an undergraduate research project", 2000 ASEE Proceeding (Refereed paper in proceeding), S-2513
4. S. Roy, F. Larachi, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000), A theoretical investigation of resolution and sensitivity in computer automated radioactive particle tracking (CARPT), process imaging for automatic control, (Refereed paper in proceeding), SPIE Int. Symp. On Intelligent Systems for Advanced Manufacturing, Boston, November 5-8
3. F. Larachi, M. H. Al-Dahhan, M. P. Dudukovic, A. Laurent, (1996), High pressure trickle-bed reactors: a state-of-the-art review, Proceeding of the 12th International Congress of Chemical and Process Engineering, CHISA'12, Prague, Czech Rep., August 25-30
2. M. H. Al-Dahhan, Y. Wu, M. R. Khadilkar, M. P. Dudukovic, (1996), Improved prediction of pressure drop and liquid holdup in high pressure trickle-bed reactors", Proceeding of the 5th World Congress on the Chemical Engineering, San Diego, Vol. I, 209
1. Muthanna H. Al-Dahhan, (1995), Computing and computer applications in engineering education", The Proceeding of 4th World Conference on Engineering Education, Vol. II, 1, October 15-20, Minneapolis/St. Paul, Minnesota

Non-Peer Reviewed Publications

15. Faris Hammoodi Al-Ani, Muthanna H Al-Dahhan, Hussein Ali Sabtie, Afaf Jadaan Obaied, (2017), Bioremoval capacity of phenol by microalgae, Kalpana Corporation, Vol 37, 475-480
14. Muthanna Al-Dahhan, Faris Al-Ani, Afaf Al-Saned, (2018), Biodegradation of phenolic components in wastewater by micro algae: a review, MATEC Web of Conferences, Vol 162, 05009
13. M. O. Kagumba, Y. Abdulaziz, and M.H. Al-Dahhan, (2012), Effect of Internals and Solids Loading on Bubble Dynamics in Slurry Bubble Columns, 2012 AIChE Annual Meeting, October 28-November 2, David L. Lawrence Convention Center, Pittsburgh PA, U.S.A
12. Gahnim M. Alwan, Muthanna Al-Dahhan, (2011), Simulation and multi-objective optimization of a continuous biochemical reactor using multilayer modeling technique, Proceeding of AIChE-2011 Annual Meeting, October 16-21, Minnesota
11. Gahnim M. Alwan, Muthanna Al-Dahhan, (2011), Multi-objective optimization of autothermal catalytic membrane reactor using genetic algorithm, Proceeding of AIChE-2011 Annual Meeting, October 16-21, Minnesota
10. G.M. Alwan, S. Nedeltchev, S. Aradhya and M. Al-Dahhan, (2011), Multi-objective Optimization of a Spouted Bed Reactor, Proceeding of AIChE Annual Meeting, Minneapolis, Minnesota (USA), October 16-21

9. D. Tasmatsoulis, Muthanna H. Al-Dahhan, F. Larachi, N. Papayannakos, (2000) "The effect of particle dilution on the wetting efficiency and liquid film thickness in small trickle beds", Proceedings of the 3rd Int. Symp. Catalysis in Multiphase Reactors, Naples, Italy, May 29-31
8. Y. Jiang, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) "CFD modeling of multiphase flow distribution in catalytic packed-bed reactors: scale down issues", Proceedings of the 3rd Int. Symp. In Catalysis in Multiphase Reactors, Naples, Italy, May 29-31
7. Y. Jiang, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) "A parallel approach to catalyst and reactor selection for fine chemical processes", Proceedings of the 3rd Int. Symposium in Catalysis in Multiphase Reactors, Naples, Italy, May 29-31
6. S. Roy, J. Chen, S. Degaleesan, P. Gupta, M.H. Al-Dahhan, M.P. Dudukovic, (1998) "Non-invasive flow monitoring in opaque multiphase reactors via CARPT and CT", Proceeding of FDESM' 98 [FDESM98-5077], 1998 ASME Fluids Engineering Division Summer Meeting, June 1998, 245, 7/50-7/68
5. S. Degaleesan, P. Gupta, J. Chen, M. H. Al-Dahhan, M. P. Dudukovic, B.A. Toseland, B. L. Bhatt, (1997) "Progress in understanding the fluid dynamics of babble column reactors", Published in the DOE Annual Review Report, Pittsburgh, PA
4. Y. Wu, M. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, (1997) "Effect of catalyst wetting on the performance of trickle-bed reactors", Proceeding of the Second Joint U.S./China Chemical Engineering Conference, Beijing, China, May 19-22, page 234
3. M. P. Dudukovic, M. H. Al-Dahhan, M. Khadilkar, Y. Wu, (1997) "Study of trickle-bed reactor performance under periodic operation", Proceeding of the Second Joint U.S./China Chemical Engineering Conference, Beijing, China, May 19-22, page 286
2. Muthanna H. Al-Dahhan, Chemical Reaction Engineering Laboratory at Washington University, in the article of, Developing Environmental Technology – Cooperatively, edited by E. Beaver, CHEMTECH, 10, (1996).
1. M. H. Al-Dahhan and M. P. Dudukovic, (1995) "Liquid catalyst contacting efficiency in high pressure trickle-bed reactors with/without fines", Extended Abstract, The second Italian Conference on Chemical Process Engineering, Firenze, 15-17 May

Selected Recent Technical Reports

28. Technical and final reports to Idemitsu Kosan Co., Ltd., Japan (2020), Identifying the Locations of Heavy Metal Contaminants Penetrated with the Flow inside a Trickle Bed Reactor Using Radioactive Particle Tracking (RPT).
27. Technical and final reports to Idemitsu Kosan Co., Ltd., Japan (2018), Phase Distributions and Holdups in a Moving Bed Reactor Using Gamma-Ray Computed Tomography (CT) Technique
26. Technical and final reports to Idemitsu Kosan Co., Ltd., Japan (2018), Phase Distributions and Holdups in a Trickle Bed Reactor Using Gamma-Ray Computed Tomography (CT) Technique.
25. Technical and final reports to DOE – NEUP funding, 2014-2017
24. Technical report to Rentech on assessing the risk and the mitigation of scaled up FT slurry bubble column reactor for biodiesel, 2013
23. Technical report to ADM on assessing the design and performance of aqueous hydrotreating trickle bed reactors, 2012
22. Two technical reports to KISR – Kuwait on OCR unit, 2013
21. Quarterly reports and final reports for the DOE-NERI grants, 2008-2012
20. Co-Authored final report to DOE (2007) on "Improved Biomass Utilization in Digester through Remote Flow Sensing" DOE/Energy Efficiency Science Initiative, 2001-2007
19. Co-authored Sandia National Laboratory report (2006) on circulating Fluidized Bed Hydrodynamics Experiments for Multiphase Fluid Dynamics Research Consortium (MFDRC), SAND Report, SAND 2006-4914
18. Co- authored IAEA (International Atomic Energy Agency) consultants meeting (CM) report (2008) on radiometric techniques for multiphase flow systems, October, 2008, IAEA, Vienna, Austria
17. Co-authored IAEA (International Atomic Energy Agency) consultants meeting (CM) report (2007) on radioactive particle tracking techniques for investigation of industrial reactors, October 22-25, IAEA, Vienna, Austria
16. Co-authored and supervised numerous monthly, quarterly and final reports submitted to the research sponsors for all the grants as PI, Co-PI and Co-Investigator listed in the grants section

15. Co-authored and supervised the quarterly report to DOE on “Improved Biomass Utilization in Digester through Remote Flow Sensing” DOE/Energy Efficiency Science Initiative, October 2001- March 2007
14. Authored the quarterly progress reports for the high pressure slurry bubble column consortium, 1999-2002
13. Co-authored and supervised the annual reports and final report on “Advanced Diagnostics Techniques for Three-Phase Slurry Bubble Column Reactors”, for the DOE grant – DE-FG-26-99FT40594, July 2000 - 2002
12. Co-authored the final technical report “Flow distribution in laboratory and pilot plant fixed bed reactor packed with structured packing, June 2001
11. Co-authored and supervised the extensive technical review on the bubble column submitted to the High Pressure Slurry Bubble Column Consortium which is sponsored by Air Products and Chemicals (USA), Conoco (USA), Sasol (South Africa), and Statoil (Norway)
10. Co-author of the Annual Technical Reports for years 1, 2 & 3, Novel Techniques for Slurry Bubble Column Hydrodynamics, Submitted by Washington University, Ohio State University and Exxon Research and Engineering to DOE, DOE-FG22-95PC95212
9. Co-author of monthly, quarterly and topical reports on Engineering Development of Slurry Bubble Column Reactor Technology, Submitted to Air Products - DOE, DOE FC22-95PC95051 Via Air Products (1996-2003).
8. Author of the final technical report “Hydrodynamic Study in an Ebullated Bed” submitted to UOP LLC for the performed research contract (January 1, 1998 – May 31, 1999), March, 1999.
7. Co-author of the final technical report “Implementation of Computer Automated Radioactive Particle Tracking (CARPT) on a Gas-Solid Riser: Experiment Design and Analysis” submitted to Sandia National Laboratory and Chevron for the fund received as a part of Multiphase Fluid Dynamics Research Consortium (MFDRC), October, 1999
6. Co-author of the final technical report “Hydrodynamics of countercurrent Bubble column with internals” submitted to DuPont for the performed research contract, (1998)
5. Co-author of the final technical report “Study of Particle Motion on Packed/Ebullated Beds by Computer Automated Radioactive Particle Tracking (CARPT) and Computed Tomography (CT)” submitted to Chevron for the performed research contract, (April, 1998).
4. Co-author of the final technical report “Hydrodynamic Studies of Liquid-Solid Riser Flow” submitted to UOP for the performed research contract (September 1, 1995 – March 31, 1996), (April, 1996)
3. Co-author of the final technical report “Investigation of High Selectivity, High Volumetric Productivity Reactor for Production of Amino Alcohol” submitted to Monsanto for the performed research contract, (December, 1996)
2. Authored reports on the following topics: General electric ring opening polymerization products properties, 1989; Modeling of mechanically agitated three phase slurry reactors, 1989; Reverse osmosis membranes, 1987; Monolith catalytic reactors, 1987; Two phase flow, 1986; and Capillary tube viscometer design, 1986
1. Authored a comprehensive technical and operating manual for the pilot research facilities in which I worked, 1983, and wrote about 3 to 4 technical and research reports a year, 1982 – 1985

INVITED TALKS - NATIONAL AND INTERNATIONAL

162 (2021) Advanced Measurement Techniques for Advancing Sustainable Infrastructure and for Mineral Processing, *Environmental, Mining, and Circular Economy, Mohamed VI Polytechnic University (UM6P), Morocco,* September 22, 2021

161. (2021) Selected Recent Advances on the 4th Generation Nuclear Reactors, *Alternative Energy: Opportunities and Challenges College of Engineering- AlMusaib, University of Babylon, Iraq, via Zoom,* July 15, 2021

160. (2021) ABET Overview, *Mohamed VI Polytechnic University (UM6P), Morocco,* July 2&9, 2021

159. (2020) Research Approach and the Role of the Faculty Members in USA Academia, *Al-Nahrain University, Baghdad, Iraq, via Zoom,* November 14, 2020

158 (2020) Spent Nuclear Fuel and Radioactive Waste Management: Current Status and Future Needs, Radioactive Waste Management Course, Nuclear Engineering Department, New Mexico University, November 4, 2020

157 (2020) 4th Generation Nuclear Energy and Its Radioactive Wastes, Radioactive Waste Management Course, Nuclear Engineering Department, New Mexico University,

October 26, 2020

156. (2020) Contemporary Issues in Alternative Energy: Recent Advances, Network of Iraqi Scientists Abroad (NISA), *via Zoom, October 12, 2020*

155. (2019) ABET Accreditation and Quality Assurance in Higher Education
Al-Kitab University, Kirkuk, Iraq, December 22, 2019

154. (2019) Thoughts on Quality Assurance in Higher Education
College of Law, Al-Qadisiyah University, Iraq, December 22, 2019

153. (2019) Multi-Scale Study for Advancing Culturing Microalgae/Cyanobacteria
College of Engineering, Al-Qadisiyah University, Iraq, December 18, 2019

152. (2019) Emulsion Liquid Membrane (ELM) Technology for Water and Wastewater Treatment Removal of Pb (II) as an Example
College of Engineering, Al-Qadisiyah University, Iraq, December 18, 2019

151. (2019) Combining Science and Engineering in Advancing Biotechnology Processes: Example of Microalgae/Cyanobacteria Culturing
College of Science, Al-Qadisiyah University, Iraq, December 17, 2019

150. (2019) Multiphase Flow and CFD Benchmarking Using Integrated Advanced Techniques
Unicamp, Campinas, Brazil, October 23, 2019

149. (2019) An Overview of Some Recent Developments of Pebble Bed and Prismatic Block Gen IV Nuclear Reactors and Their TRISO Fuel Particles Manufacturing
Nuclear Engineering Department, University of New Mexico, April 30, 2019

148. (2018) Advanced Measurement and Computing Techniques for Advancing Gas and Oil Down and Up Streams Processes
Kuwait Institute for Scientific Research (KISR), Kuwait, Dec 26, 2018

147. (2018) Advancing Microalgae Culturing by Advanced Measurement and Computing Techniques for Bioenergy, Flue Gas & Waste Water Treatment, & High Value Products
Kuwait Institute for Scientific Research (KISR), Kuwait, Dec 26, 2018

146. (2018) ABET Accreditation – The Process and The Needs to Obtain It
Pakistan Institute of Engineering and Applied Sciences (PIEAS), August 16, 2018

145. (2018) Advanced Measurement Techniques for Multiphase Reactors and Flows Studies
Pakistan Institute of Engineering and Applied Sciences (PIEAS), August 14, 2018

144. (2018) Advancement Measurement Techniques for Validation of Computational Fluid Dynamics (CFD) *National Energy Technology Laboratory (NETL), NETL - Multiphase Workshop, Houston - Aug 7-9, 2018*

143. (2018) Advanced Measurement Techniques for Benchmarking CFD Simulations of Multiphase Flows *Chiba University, Japan, July 13, 2018*

142. (2018) Advancing Multiphase Reactors and Multiphase Flows by Sophisticated Measurement Techniques and Benchmarking CFD
Idemitsu, Japan, July 9, 2018

141. (2018) Sophisticated Radiation Based Measurement Techniques and Their Applications in Advancing the Engineering Knowledge of Multiphase Flow and Reactors,
International Atomic Energy Agency (IAEA), Consultants Meeting, Krakow, Poland, June 25-29, 2018

140. (2018) Enabling Processes Intensification of Multiphase Reactors and Flows by Advanced Understanding and Benchmarking CFD and Multiscale-Modeling via Sophisticated Measurement Techniques
University of Arkansas, Fayetteville, USA, March 8, 2018

139. (2017) Muthanna Al-Dahhan, Hayder Al-Naseri, Abbas Sultan, and Laith Sabri (Invited Poster), CFD Simulation and Validation of Bubble Columns with Internals
The Annual Total Seminar on Mathematics, Numerical Simulations, Numerical Methods, HPC, Data Science (MATHIAS 2017), Hotel L'Elysee, Val d'Europe, Disneyland Paris, France, October 25-27, 2017

138. (2017) Vaibhav Khane, Ibrahim A. Said, Muthanna Al-Dahhan, Experimental Study of Pebble Flow Dynamics in a Pebble Bed Modular (PBMR) Using Radioactive Particle Tracking (RPT) Technique
International Conference on Applications of Radiation Science and Technology, ICARST 2017, IAEA, Vienna, Austria, April 24-28, 2017

137. (2017) Laith S. Sabri, Abbas J. Sultan and Muthanna H. Al-Dahhan, Radioactive Particle Tracking (RPT) Technique for Tracking Microalgae's cells Movement Velocity Field in a Split photobioreactor Column
International Conference on Applications of Radiation Science and Technology, ICARST 2017, IAEA, Vienna, Austria, April 24-28, 2017
136. (2017) Abbas J. Sultan, Laith S. Sabri, and Muthanna H. Al-Dahhan, Linear Attenuation Coefficients and Gas Holdup Distributions in Bubble Column with Vertical Internal for Fischer-Tropsch (FT) Synthesis, International Conference on Applications of Radiation Science and Technology *ICARST 2017, IAEA, Vienna, Austria, April 24-28, 2017*
135. (2017) Ali Toukan, Vineet Alexander, Muthanna H. Al-Dahhan, Flow Regime Identification in a Co-current Gas-Liquid Upflow Moving Packed Beds Reactor Using Gamma Ray Densitometry
International Conference on Applications of Radiation Science and Technology, ICARST 2017, IAEA, Vienna, Austria, April 24-28, 2017
134. (2017) Ali Toukan, Vineet Alexander, Muthanna H. Al-Dahhan, Liquid Holdup Studies in a Co-current Gas-Liquid Upflow Moving Packed Bed Reactor with Porous Catalyst using Gamma Ray Densitometry
International Conference on Applications of Radiation Science and Technology, ICARST 2017, IAEA, Vienna, Austria, April 24-28, 2017
133. (2017) Vineet Alexander and Muthanna H. Al-Dahhan, Bed Expansion in Upflow Moving Catalytic Packed/Expanded Bed Hydrotreating Reactor using Gamma Ray Densitometry
International Conference on Applications of Radiation Science and Technology, ICARST 2017, IAEA, Vienna, Austria, April 24-28, 2017
132. (2017) Mohammed H. S. Zangana, Fakhri Ibrahim, Srwa Khaleel, Muthanna Al-Dahhan, Reuse of Spent molecular sieves from oil and gas industry
International Conference on Environmental Impacts of the Oil and Gas Industries, Koya University, Koya – Kurdistan – Iraq, April 17-19, 2017
131. (2017) Francisco Das Chagas Silva Neto, Nasser Zouli, Felipe Lembcke, Eduardo Gomez-Maqueo, Muthanna Al-Dahhan, Treatment of Reuse of Petroleum Produced Water Using Intensified Ceramic Membrane
International Conference on Environmental Impacts of the Oil and Gas Industries, EIOGI 2017, Koya University, Koya – Kurdistan – Iraq, April 17-19, 2017
130. (2017) Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, Assessment of RPT Calibration during Microalgae Culturing for Wastewater Treatment of Petroleum and Gas Industry
International Conference on Environmental Impacts of the Oil and Gas Industries, Koya University, Koya – Kurdistan – Iraq, April 17-19, 2017
129. (2017) New Approaches for Advancing Pebble Bed, Prismatic Block Nuclear Reactors and Manufacturing TRISO Nuclear Fuel Particles for 4th Gen Nuclear Energy
Nuclear Engineering, Purdue University, West Lafayette, Indiana, March 3, 2017
128. (2017) Advancing Industrial and Environmental Processes Multiphase Reactors by Benchmarking CFD via Sophisticated Measurement Techniques
EPIC – Louisan State University, Baton Rouge, Louisiana, January 27
127. (2017) Overview of Advanced Measurement Techniques for Multiphase Flow
University of Zakho, Zakho, Kurdistan-Iraq, January 8, 2017
126. (2016) Quality Assurance and ABET Accreditation
Koya University, Kurdistan-Iraq, November 22, 2016
125. (2016) How to Minimize and Eliminate Wastes by Developing and Implementing Advanced Measurement and Computing Techniques to Advance Multiphase Reactors
Koya University, Kurdistan-Iraq, November 21, 2016
124. (2016) Advances in Scale-Up of Some Multiphase Reactors
In Honor of Dr. R. Lange (of Technical University of Dresden, Germany), AIChE Annual Meeting, San Francisco, CA, November 14, 2016
123. (2016) A New Mechanistic Methodology for Scale-Up of Multiphase Reactors and Multiphase Flows Enabled by CFD and Advanced Measurement and Techniques
MATHIAS 2016, Total, Elysee Val d'Europe, Paris, France, October 26-28, 2016
122. (2016) New Approaches for Advancing Pebble Bed Nuclear Reactors for 4th Gen Nuclear Energy
Chemical Engineering Department, College of Engineering, UM-Columbia August 30, 2016

121. (2016) Trend in Minimizing and Treating Industrial Wastes for Sustainable Environment: The Role of Multiphase Reactors and Needed Advanced Measurement and Computing Techniques
Parks College of Engineering, St. Louis University, St. Louis, MO, April 19, 2016
120. (2016) Trend in Minimizing and Treating Industrial Wastes for Sustainable Environment: The Role of Multiphase Reactors and Needed Advanced Measurement and Computing Techniques
Environmental Research Center, Missouri S&T, April 15, 2016
119. (2016) Multiphase Reactors and Multiphase Flow System for Process Development: What are the needs?
AIChE Student Chapter, ChBE, Missouri S&T, Rolla, MO, January 27, 2016
118. (2016) Advances on Multiphase Reactors by Developing Advanced Measurement Techniques, *Chemical Engineering Department, Istanbul Technical University, ITU, Istanbul, Turkey, January 13, 2016*
117. (2016) Hydrodynamics of Fluidized Beds
Sharq, SABIC, Al Jubail, Saudi Arabia, January 11, 2016
116. (2016) Scale up of Fluidized Beds and Multiphase Reactors
SABIC R&D Center, Riyadh, Saudi Arabia, January 10, 2016
115. (2016) Multiphase Reactors: Recent Advances
King AbdulAziz City for Science and Technology (KACST), Riyadh, Saudi Arabia, January 10, 2016
114. (2015) M. Al-Dahhan, H. Al-Bazaz, V. Alexander, Performance Evaluation of On-stream Catalyst Replacement (OCR) Reactor Using Advanced Measurement Techniques
Kuwait National Petroleum Company (KNPC), Kuwait, December 30, 2015
113. (2015) M. Al-Dahhan and Students, Arab Culture of Middle East and North Africa
Global Culture Exchange Program, Chemical and Biochemical Engineering department, Missouri S&T, Rolla, MO, October, 2015
112. (2015) Best Practices for Implementing Chemical Safety and security in Iraqi Universities and Lesson Learnt *Pacific Northwest National Lab (PNNL),*
University Chemical Safety and Security Framework, Workshop supported by US State Department, Istanbul, Turkey, September 13-17, 2015
111. (2015) Trends in Minimizing Industrial wastes for Sustainable Environment
SYMPHOS 2015, Marrakech, 18-20 Amy, 2015
110. (2015) Gas Conversion to Clean Liquid Fuels and Chemicals via Fischer-Troapsch Slurry Bubble Column: Some of Its Recent Advances & Benchmarking CFD and Models
Illinois Institute of Technology, Chicago, February 25, 2015
109. (2015) Advanced Measurement Techniques for Benchmarking CFD and Models for Multiphase Reactors and Flow Systems
UOP, Chicago, February 25, 2015
108. (2015) Recent Advances on Particle-Fluid Systems and the Related Advanced Measurement and Computing Techniques
PSRI (Particulate Solid Research Inc.), Chicago, February 24, 2015
107. (2015) Advanced Studies of Multiphase Reactors via Advanced Measurement and Computing Techniques
Gas Technology Institute (GTI), Chicago, February 26, 2015
106. (2015) Gas Conversion to Clean Liquid Fuels and Chemicals via Fischer-Tropsch Slurry Bubble Column: Some of Its Recent Advances & Benchmarking CFD and Models - New Results and New advanced techniques for Multiphase Industrial Processes
India National Chemical Laboratory (NCL), Pune, India, January 2, 2015
105. (2015) Improved Fundamental Understanding of Industrial Multiphase Processes Using Advanced Techniques
IIT Bombay, Mumbai, India, January1, 2015
104. (2014) Multiphase Reactors in Petroleum Industry: Selected Recent Advances via Sophisticated Measurement & Computing Techniques
Bharat Petroleum R&D Center, India, December 30, 2014
103. (2014) Multiphase Reactors in Petroleum Industry: Catalyst Testing and Kinetics Development in Two Phase Packed Bed Reactors for Hydrotreating
UOP R&D Center, India, December 30, 2014

102. (2014) Recent Advances on Multiphase Reactors & Flow Systems for Energy, Environmental and Products Processes via Sophisticated Measurement & Computing Techniques
IIT Delhi, New Delhi, India, December 29, 2014
101. (2014) Gas Conversion to Clean Liquid Fuels and Chemicals via Fischer-Tropsch Slurry Bubble Column: Some Recent Advances
West Virginia University, Morgan Town, WV, November 11, 2014
100. (2014) Monitoring of Multiphase Reactors for Environmental Risks Mitigation
The 3rd International Conference & Exhibition on Laboratory Technology, Manama, Bahrain, October 28-30, 2014
99. (2014) Recent Advances on Pebble Bed Nuclear Reactor for 4th Generation Nuclear Energy via Novel Integration of Advanced Measurement and Computing Techniques
Department of Chemistry, Missouri S&T, September 15, 2014
98. (2013) Thoughts on Engineering Education and Industrial Interactions
Engineering College, Koya University, Kurdistan, February 2, 2013
97. (2013) Quality Assurance in Engineering Education toward Accreditation
University of Technology, Baghdad, Iraq, December 31, 2013
96. (2013) Advancing Multiphase Processes and Benchmarking Computational Models and Simulations through Sophisticated State-Of-The-Art Measurement and Monitoring Techniques
OCP – Phosphate and its derivatives, El-Jadida, Morocco, July 4, 2013
95. (2013) Application of Nuclear Techniques in Industry: Lab and Fields Techniques
National Workshop on Applications of Nuclear Techniques in Industry Sponsored by IAEA and KISR-Kuwait, June 25-26, 2013
94. (2013) State-of-the-Art Sophisticated Techniques for Advancing Multiphase Flow Processes
National Workshop on Applications of Nuclear Techniques in Industry Sponsored by IAEA and KISR-Kuwait, June 25-26, 2013
93. (2013) Nuclear Safety and QA in Labs for Nuclear Techniques for Industrial Applications
National Workshop on Applications of Nuclear Techniques in Industry Sponsored by IAEA and KISR-Kuwait, June 25-26, 2013
92. (2013) Muthanna Al-Dahhan, M. Al-Mesfer, M. Kagumba, A. Sheikh, Gas Conversion to Clean Liquid Fuels via Fischer-Tropsch Slurry Bubble Column – Some Recent Advances
7th Sino-US, Beijing, China, October 14-18, 2013
91. (2013) Muthanna Al-Dahhan, Shreekanta Aradhya, Faraj Zaid, Neven Ali and Thaar Aljuwaya Scale-up and on-line monitoring of gas-solid systems using advanced and non-invasive measurement techniques
International Symposium SYMPHOS, Morocco, Agadir, May 6-10, 2013
90. (2012) Means for curricula improvement and modernization, teaching methods, educational technologies, and ways for establishing effective collaboration with foreign universities
3rd International Conference on Development of Higher education in Iraq, Baghdad, Iraq, November 27-29, 2012
89. (2012) Recent advances in selected routes for alternative energy
3rd International Conference on Development of Higher education in Iraq, Baghdad, Iraq, November 27-29, 2012
88. (2012) Applications of nuclear based measurement and monitoring techniques in industry with special focus on oil industry
KISR (Kuwait Institute for Scientific Research), Kuwait, August 14, 2012
87. (2012) Radiation safety for nuclear based measurement and monitoring techniques in industry
KISR (Kuwait Institute for Scientific Research), Kuwait, August 14, 2012
86. (2012) Benchmarking Computational Fluid Dynamics (CFD) Using Advanced Measurement Techniques
Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA, July 24, 2012
85. (2011) How lab Studies could enable Commercialization: Selected Examples Including Scale-up Methodology
Kuwait Institute of Scientific Research (KISR), Kuwait, July 5, 2011
84. (2011) Scale-up of Bubble Columns
SABIC R&D, Riyadh, Saudi Arabia, May 17, 2011

83. (2011) Recent Advancement of Multiphase Reactors
SABIC headquarter, Riyadh, Saudi Arabia, May 16, 2011
82. (2011) Energy from Sustainable Biomass Conversion Technologies, Sustainable Energy Technologies (SET)
May 21, 2011 – Riyadh, King Saud University
81. (2011) Advancing Multiphase Processes for Sustainable and Clean Energy and Environment via Sophisticated Techniques
TU Braunschweig, Germany, March 17, 2011
80. (2011) Role of Radioisotopes Based Techniques in Advancing Multiphase Flow Reactors and Systems *Institute of Safety Research, Experimental Thermal Fluid Dynamics, Dresden - March 16, 2011*
79. (2011) Current Trends on Gas-Liquid-Solid Reaction Engineering Trends in Multiphase Reactor Design *Chemical Reaction Engineering – Technical University Dresden, Sponsored by Federal Ministry of Education and Research, Dresden – Germany, March 14-16, 2011*
78. (2010) M. H. Al-Dahhan, O. Sitton, N. Book, J.-C., Wang, D. Ludlow, Assessment of Engineering and Science Undergraduate programs
University of Al-Muthanna, Iraq, December 30, 2010
77. (2010) M. H. Al-Dahhan, O. Sitton, N. Book, J.-C., Wang, D. Ludlow, (2010) Assessment of Engineering and Science Undergraduate programs for lifting the quality of Education in Iraq
Engineering College, University of Kufa, Iraq, December 28, 2010
76. (2010) Research and Development (R&D) of Various Processes for Sustainable Energy and Environment
Indo-US Workshop on Energy and Environment: Challenges & Research Opportunities, New Delhi, December 12-15, 2010
77. (2010) Advancement of Multiphase Flow Reactors and Systems via Development of Advanced Non-Invasive Radioisotopes Based Techniques
Chemical and Nuclear Engineering Department, University of New Mexico, October 26, 2010
74. (2010) Bioenergy from Biomass
Institute Mexico del Petroleum (IMP), Mexico City, Mexico, June 17, 2010
73. (2010) Radioisotopes application in industry
AIChE Chapter, Chemical and Biological Engineering Department, April 2010
72. (2009) Microalgae as a promising source of bioenergy
Karbala University, Karbala, Iraq, December 24, 2009
71. (2009) Overview of bioenergy production, Special Symposium on Bioenergy
Al-Nahrain University, Baghdad, Iraq, December 23, 2009
70. (2009) Recent advances in multiphase reactors
Al-Nahrain University, Baghdad, Iraq, December 23, 2009
69. (2009) Advanced measurement techniques for multiphase flow systems
College of Engineering, Al-Mustansyria University, Baghdad, Iraq, December 22, 2009
68. (2009) Multiphase reactors for clean fuels and chemicals
Chemical Engineering Department, University of Baghdad, Baghdad, Iraq, December 21, 2009
67. (2009) Advancing the Fundamental Understanding and Scale-up of TRISO Fuel Coaters via Advanced Measurement and Computational Techniques
DOE NERI review meeting, Salt Lake City, Utah, August 11-12, 2009
66. (2009) Solids and Gas Dynamics of Pebble Bed Reactors
DOE-NERI review meeting, Salt Lake City, Utah, August 11-12, 2009
65. (2009) Applications of Radioisotopes Based Techniques in Industrial Processes Including 4th Generation Nuclear Energy
Korea Atomic Energy Research Institute, South Korea, July 8, 2009
64. (2009) Development of International Partnerships and Consortium
Ministry of Science and Technology, Iraq, June 25, 2009
63. (2009) An Overview of Clean Alternative energy
College of Engineering, University of Al-Qadisiyah, Iraq, June 21, 2009

62. (2009) Radioisotopes Application in Industry
Nuclear Engineering Department, Missouri S&T, Rolla, MO, April 27, 2009
61. (2009) Advances of Synthesis Gas Conversion into Clean Alternative Fuels and Chemicals
System Engineering, Missouri S&T, Rolla, MO, April 1, 2009
60. (2009) Multiphase Reaction Engineering for Clean Energy and Environment
UiTM – University, Shah Alam, Malaysia, February 5, 2009
59. (2009) Graduate Studies and Research in Chemical Engineering
UiTM – University, Shah Alam, Malaysia, February 2-6, 2009
58. (2009) ABET Requirements Implementation for Chemical Engineering Programs
UiTM – University, Shah Alam, Malaysia, February 2-6, 2009
57. (2009) Computing and Computer Applications in Chemical Engineering Undergraduate Curriculum
UiTM – University, Shah Alam, Malaysia, February 4, 2009
56. (2009) Integrating Hydrodynamics and Transport with Kinetics for Proper and Efficient Design, Scale-up and Performance Prediction: Example of Trickle Bed Reactors (TBR) for Clean Fuels and Environmental Applications
Chemistry department, Missouri S&T, Rolla, MO, March 2, 2009
55. (2009) M.H. Al-Dahhan, R. Varma, M. Vesvikar, K. Karim, R. Hoffman, D. DePaoli, K. Klasson, A. Winterberg, C. Alexander, Bio-energy Production from Anaerobic Digestion of Animal and Farm Wastes *Energy Summit, University of Missouri Systems, Columbia, MO, April 22-23, 2009*
54. (2009) How Can We Help Higher Education in Iraq
Iraqi Academics conference – US national academies, Washington D.C., March 14-15, 2009
53. (2009) Clean and Energy Efficient Coal Utilization
Board of Trustees, Missouri S&T, Rolla, April 3, 2009
52. (2008) Novel Modeling Approach of Microalgae Culturing in Photobioreactors for Renewable Energy *NSF – CEBC (Center for Environmental Beneficial Catalysis) Colloquium, November 20, 2008*
51. (2008) Al-Dahhan, M.H., Yablonsky, G.S., Gleaves, J.T., Zheng, X., Feres, R., Process Development from Molecular Scale, Catalyst Design to Process Reactor Scales: How and What are the needs
Kuwait Institute of Scientific Research (KISR), Petroleum Research Center, Kuwait, December 2008
50. (2008) Recent Advances and Scale-up of Trickle Bed Reactors (TBR) for Clean Fuels and Environmental Applications - Scale-up and design issues of multiphase Packed Bed Reactors for petroleum processing
Kuwait Institute of Scientific Research (KISR), Petroleum research center, Kuwait, December, 2008
49. (2008) Muthanna Al-Dahhan, Rajneesh Varma, Mehul Vesvikar and Ashfaq Shaikh, Advanced Radiometric Measurement Techniques for Industrial Multiphase Flow Systems: Dual Source
Gamma Ray Computed Tomography (DSCT), Multiple Radioactive Particles Tracking (MRPT)
& Nuclear Gauge Densitometry (NGD) Techniques
International Atomic Energy Agency, IAEA, Vienna, October 14, 2008
48. (2008) Advancing the Knowledge and Understanding of Multiphase Reactors via Advanced Measurement Techniques
Wuhan Institute of Chemical Technology, Wuhan, China, July, 2008
47. (2008) Educational Approaches for Bio-Processes and The Needed Advanced measurement Techniques for Their Efficient Design and Scale-up: What are the Needs
International Conference on Yeast, ICY-2008, Kiev, Ukraine, August 11-15, 2008
46. (2008) Imaging and Visualization Techniques for Multiphase Flow Systems
Beijing University of Chemical Technology, July, 2008
45. (2008) Culturing Microalgae in Photobioreactors
Missouri University of Science and Technology, Rolla, MO, July 10, 2008

44. (2008) Multiphase Reactors for Clean Energy
TU Dortmund-University, Germany, June, 2008
43. (2008) Scale-up Issues on Multiphase Reactors
Bayer, Germany, June, 2008
42. (2008) Advancement of Slurry Bubble Columns for Clean Alternative Fuels
Jonson Matthey Catalyst, UK, May 29, 2008
41. (2008) Advanced Radiometric Techniques to Visualize Multiphase Flow Systems
Nuclear Malaysia Agency, Kula Lumpur, Malaysia, May 14, 2008
40. (2008) Advancing the Design and Scale-up of Multiphase Packed Bed Reactors
National University of Malaysia, Kula Lumpur, Malaysia, May 22, 2008
39. (2008) Culturing Microalgae for CO_2 Fixation, Gas Treatment and Renewable Energy
Center Ethanol, February 2008
38. (2007) Advancement of Trickle Bed Reactors Scale-up and Design for Clean Fuels Production
Indian Oil R&D Center, December, Faridabad, India, 2007
37. (2007) Henriques, A., Johnston, D., and Al-Dahhan, M., Enzymatic Water Removal from Distiller's Grains
Southern Illinois University, SIUE: Edwardsville, IL, 2007
36. (2007) Henriques, A., Johnston, D., and Al-Dahhan, M., Energy Efficient Bioethanol and Distiller's Grains Process
Center Ethanol, LLC, Sauget, IL, 2007
35. (2007) S. Antal, R. Lahey, M. H. Al-Dahhan, Capabilities of Mechanistic Closures in Prediction the Hydrodynamics of Bubble/Slurry Bubble Columns Using CFD-NPHASE Code
IBCAST – 2007, Pakistan, January 8-12, 2007
34. (2007) Vaishali, S., Shantanu Roy, Satish Bhusarapue, (2007) M.H. Al-Dahhan, M.P. Dudukovic, CFD in Gas-Solid Riser
IBCAST – 2007, Pakistan. January 8-12, 2007
33. (2007) K. Karim, G. J. Thoma, M. H. Al-Dahhan, (2007) Gas-lift Anaerobic Digester Configuration Effects on Mixing Effectiveness for Biogas Production
IBCAST – 2007, Pakistan, January 8-12, 2007
32. (2007) Advancement Made Slurry Bubble Column Reactors for Clean Alternative Energy Production *Idaho National Laboratory, April 19, 2007*
31. (2006) Advances in FT Reactor Technology for Alternative Energy and Chemical Production: Dynamic Similarity via Advanced Diagnostic Techniques
University of Dresden, Dresden, Germany, October 18, 2006
30. (2006) Advancement in Multiphase Reactors via Advanced Measurement Techniques
MINT – Malaysian Institute on Nuclear Technology, Kula Lumpur, Malaysia, August, 31, 2006
29. (2005) A Novel Integrated Multi-Scale Model for the Prediction of Culturing Microalgae in Photobioreactors for Renewable Energy
Chemical Engineering Department, IIT Delhi, India, December, 2005
28. (2005) Advancement in Multiphase Reactors via Non-Invasive Measurement Techniques
Indian Oil R&D Center, Faridabad, India, December, 2005
27. (2005) Antal, S.P., R. T. Lahey, M. H. Al-Dahhan, Computational Fluid Dynamics Modeling of a Bubble Column with NPHASE Computer Code
4th International Bhurban Conference on Applied Science and Technology (IBCAST), Bhurban, Pakistan, June 12-18, 2005
26. (2005) Anaerobic Digester Design Using CFD
4th International Bhurban Conference on Applied Science and Technology (IBCAST), Bhurban, Pakistan, June 12-18, 2005
25. (2005) Rafique, M, M.H. Al-Dahhan, M. P. Dudukovic, Influence of Different Closures on Hydrodynamics of Bubble Column Flows
4th International Bhurban Conference on Applied Science and Technology (IBCAST), Bhurban, Pakistan, June 12-18, 2005
24. (2005) Advances in Multiphase Reactors
Award Ceremony, Big Fish Award, Association of Graduate Engineering Students (AGES), May 19, 2005

23. (2005) Advancement in Understanding Multiphase Reactors
Engineering School, University of Pretoria, Pretoria, South Africa, May 16, 2005
22. (2005) Flow Dynamics Visualization of Opaque Multiphase Reactors by CARPT and CT
Imaging Science and Engineering Seminar, Department of Electrical and Computer Engineering, Washington University, St. Louis, MO, April 1, 2005
21. (2004) An Example of Flow Pattern and Mixing in Bioreactors using Laboratory Tools
Process Development Symposium: Working Right on the Right, Chicago, June 20-23, 2004
20. (2004) A Novel Modeling Approach for Predictions of the Dynamic Growth of Microalgae in Multiphase Photobioreactors,
Implementing Process Innovation, Biophex Conference and Expo- post Discovery Through Commercialization, San Francisco, Sep. 28-30, 2004
19. (2003) Opaque Multiphase Reactors: Flow visualization and Modeling,
2003 AIChE Process Development Symposium, Accelerating process Development for Growth, Ponoco, PA, June 22-25, 2003
18. (2003) Fluid Visualization and Modeling of Opaque Multiphase Flow Reactor
National Technical University, Athens, Greece, May-13, 2003
17. (2003) Flow Visualization of Opaque Multiphase Reactors
Sandia National Laboratory, Albuquerque, NM, October 2003
16. (2002) Recent Advances in Multiphase Reactors
Oak Ridge National Laboratory, Oak Ridge, Tennessee, November 14, 2002
15. (2002) Dynamic Growth of Microalgae Culture in Photobioreactors
Horizons in Biotechnology Forum, DuPont, June 7, 2002
14. (2002) M. H. Al-Dahhan and M. P. Dudukovic, Multiphase Reactors: Is Advanced Modeling Needed and Possible *Aspen World*
2002, Washington DC, October 27-November 1, 2002
13. (2002) Multiphase Reactors in Petroleum Processes
Aramco, Dhahran, Saudi Arabia, December 17, 2002
12. (2002) CFD Modeling and Flow Characterization of Multiphase Flow Systems
SABIC, Riyadh, Saudi Arabia, December 19, 2002
11. (2002) Recent Advances in Multiphase Reactors
King Saud University, Riyadh, Saudi Arabia, December 19, 2002
10. (2002) M. P. Dudukovic' and M. H. Al-Dahhan, Experimentation and Modeling of Multiphase Reactors *UOP, Chicago, November 25, 2002*
9. (2002) M. P. Dudukovic' and M. H. Al-Dahhan, Hydrodynamics of Multiphase Reactors
University of Southern Illinois, Carbondale, May 14, 2002
8. (2001) Tomography and Radioactive Particle Tracking Techniques for Multiphase Reactors,
Bayer Co., Germany, August 31, 2001
7. (2001) M. H. Al-Dahhan, A.R. Rammohan, P. Fongarland, S. Bhusarapu, M.P. Dudukovic, Gas-Solid Riser Flow Mapping: Effect of Dynamic Bias and Sampling Frequency on CARPT Measurements
MFDRC (multiphase fluid dynamic research consortium) review meeting, NETL (National Energy Technology Laboratory), Morgantown, WV, April 17-18, 2001
6. (2000) Slurry Bubble Column Hydrodynamics
Praxair Inc., New York, March 7, 2000
5. (1999) S. Roy, R. Dodson, F. Larachi, M.H. Al-Dahhan, M.P. Dudukovic, Flow Mapping in a Gas-Solid Riser via Computer Automated Radioactive Particle Tracking
1999 Annual Meeting of the Multiphase Fluid Dynamics Research Consortium (MFDRC), Mendenhall, Pennsylvania, September 26-28, 1999
4. (1999) M.H. Al-Dahhan, M.P. Dudukovic, Scale-up in Reaction Engineering
Invited Lecture, 307a, AIChE Annual Meeting, Miami Beach, Florida, November 15-20, 1999
3. (1998) Multiphase Reactors
Rose-Hulman Institute of Technology, April, 1998
2. (1995) Catalyst Wetting Efficiency in Trickle-Bed Reactors With/Without Fines
Chemical Engineering Department, University of Missouri - Columbia, March, 1995

1. (1995) Reaction Engineering at Washington University - The Chemical Reaction Engineering Laboratory
   Monsanto, Process Engineering Network meeting, November, 1995

CONFERENCES PRESENTATIONS – NATIONAL & INTERNATIONAL

500. Kifah Abid, Jihane Mendil, Muthanna Al-Dahhan, (2021), Expanded Laser Beam for Online Measurement of Dispersed Phase Holdup in Agitated Flow Liquid-Liquid Mixer of Pilot Plant Scale, 2021 Spring Meeting & 16th Global Congress on Process Safety.
499. Humayun Shariff, Muthanna H Al-Dahhan, (2020), Developing Reactor Scale Kinetics Model Integrated with Hydrodynamics Towards Scale-up of a Packed Bed Reactor, 2020 Spring Meeting & 16th Global Congress on Process Safety.
498. Amer Daham, Choji Daches, Sebastián Uribe, Noor Emad Abdulraheem, Muthanna H Al-Dahhan, (2020), Intensification of Wastewater Treatment by Integrating Fluidized Bed Crystallization and Intensified Membrane Microfiltration, 2020 Spring Meeting & 16th Global Congress on Process Safety.
497. Binbin Qi, Omar J Farid, Sebastián Uribe, Humayun Shariff, Muthanna H Al-Dahhan, (2020), Advanced Integrated Techniques for Quantifying Kinetics and Transport Parameters in Multiphase Reactors, 2020 Spring Meeting & 16th Global Congress on Process Safety.
496. Mohammed Al-Ani, Hamza AlBazzaz, Muthanna H. Al-Dahhan, (2019), Advanced Gamma-Ray Densitometry (GRD) Technique to Measure Gas and Liquid Holdups in Bench Scale Hydrotreater Reactors, 2019 AIChE Annual meeting, Nov 10-15, 2019.
495. Hayder Al-Naseri, Sebastián Uribe, Joshua P. Schlegel, Muthanna H. Al-Dahhan, (2019), The Effect of the Presence of Internals on the Flow Regime in Industrial-Scale Bubble Column Reactor, 2019 AIChE Annual meeting, Nov 10-15, 2019.
494. Mohammed Al-Ani, Muthanna H. Al-Dahhan, (2019), Advanced Optical Fiber Probe Technique to Measure Local Liquid Saturation and Velocity within Various Commercial Catalyst Shapes in Pilot Plant Trickle Bed Reactors (TBRs), 2019 AIChE Annual meeting, Nov 10-15, 2019.
493. Qusay Al-Obaidi, Muthanna H. Al-Dahhan, (2019), Advanced Removal / Extraction of the Hydrocarbons by Emulsion Liquid Membrane Enhanced by Nanoparticles, 2019 AIChE Annual meeting, Nov 10-15, 2019.
492. Binbin Qi, Omar J. Farid, Muthanna H. Al-Dahhan, (2019), Quantification and Pseudo-3D Modelling of Liquid Holdup and Maldistribution in a Trickle Bed Reactor with Validation Using Gamma-Ray Computed Tomography, 2019 AIChE Annual meeting, Nov 10-15, 2019.
491. Omar J. Farid, Binbin Qi, Muthanna H. Al-Dahhan, (2019), Application of Advanced Non-Invasive Radioisotope Techniques for Benchmarking and Scaling up of Multiphase Flow Reactors: Quantification and Validation of CFD, 2019 AIChE Annual meeting, Nov 10-15, 2019.
490. Muhna Alshammari, Hayder Al-Naseri, Muthanna H. Al-Dahhan, (2019), Study the Effect of Gas Flow Velocity on the Heat Transfer Coefficients in the Pebble Bed Reactor (PBR), 2019 AIChE Annual meeting, Nov 10-15, 2019.
489. Saud Aldawood, Hayder Alnaseri, Muhna Alshammari, Muthanna H. Al-Dahhan, (2019), Experimental Study of the Convective Heat Transfer in Single Phase with 5X5 Rod Bundle in LWR and SMR, 2019 AIChE Annual meeting, Nov 10-15, 2019.
488. M.H. Al-Dahhan, Laith Sabri, Aastha Ojha, Huping Luo, (2019), Managing Carbon Dioxide by a New Approach in Optimizing Culturing of Microalgae/Cyanobacteria for Wastewater and Flue Gas Treatment, Sustainable Environment, Bioenergy and Valued Products, 5th International Symposium on Innovation and Technology in the Phosphate Industry (SYMPHOS 2019), Morocco.
487. Quasay Al-Obaidi, M.H. Al-Dahhan, (2019), Assessing the Removal of Heavy Metals using Emerging and Intensifying Technology of Emulsion Liquid Membrane with Ionic Liquid, 5th International Symposium on Innovation and Technology in the Phosphate Industry (SYMPHOS 2019), Morocco.
486. M.H. Al-Dahhan, Neven Ali, Thaar Aljuwaya, Shreekanta Aradhya, (2019), New Scaling Methodology of New Intensified Granulation Process Based on Gas-Solid Spouted Beds, 5th International Symposium on Innovation and Technology in the Phosphate Industry (SYMPHOS 2019), Morocco.

485. K.H.Abid, J.C. Godfrey, M.J. Slater, M.H. Al-Dahhan, M.R. Dehghani, (2019), A New Modeling Approach of Mixing Quality and Axial Hold-up Distribution in Agitated Liquid-Liquid Flow Mixers for Enabling Process Intensification, 5th International Symposium on Innovation and Technology in the Phosphate Industry (SYMPHOS 2019), Morocco.
484. Laith Sabri, Abbas Sultan, Muthanna H. Al-Dahhan, (2019), Advanced Non-Invasive Radioactive Particle Tracking (RPT) and Dual-Sources Gamma Ray Computed Tomography (CT) Techniques for 3D Hydrodynamics Measurement for Multiphase Flow Systems (Visualization and Quantification), 2019 AIChE Spring meeting, March 31 - April 4, 2019.
483. Laith Sabri, Abbas Sultan, Muthanna H. Al-Dahhan, (2019), Advanced Non-Invasive On-Line Gamma-Ray Densitometry (GRD) for Hydrodynamics Measurements, 2019 AIChE Spring meeting, March 31 - April 4, 2019.
482. Laith Sabri, Muthanna H. Al-Dahhan, (2019), Advancement Measurement Techniques for Validation of Computational Fluid Dynamics (CFD), 2019 AIChE Spring meeting, March 31 - April 4, 2019.
481. Humayun Shariff, Muthanna H. Al-Dahhan, (2019), Reactor Performance Assessment Using Experimental Studies and Multiscale Modeling: Liquid Phase Ethylene Production by Hydrogenation of Acetylene, 2019 AIChE Spring meeting, March 31 - April 4, 2019.
480. Muthanna H. Al-Dahhan, (2019), Advanced Two-Tip Optical Fiber Probe Technique to Local Gas and Liquid Saturation and Velocities Measurement within Various Commercial Catalyst Shapes in Pilot Plant Trickle Bed Reactors (TBRs), 2019 AIChE Spring meeting, March 31 - April 4, 2019.
479. Binbin Qi, Omar J. Farid, Mohammed Al-Ani, Muthanna H. Al-Dahhan, (2019), Multiphase Distribution and Holdup Investigations in Trickle Bed Reactors and Upflow Moving Bed Reactors Using Gamma-Ray Computed Tomography (CT) Technique, 2019 AIChE Spring meeting, March 31 - April 4, 2019.
478. Hayder Al-Naseri, J. P. Schlegel, Muthanna H. Al-Dahhan, (2019), The Impact of Low Dynamic liquid levels on the Flow Pattern in Pilot Plant Bubble Column reactor, 2019 AIChE Spring meeting, March 31 - April 4, 2019.
477. Kifah H. Abid, James C. Godfrey, Michael J. Slater, Muthanna H. Al-Dahhan, Mohammad Reza Dehghani, (2019), "Theoretical Modeling of Mixing Quality and Axial Hold-up Distribution for Liquid-Liquid System in Agitated Flow Mixers", 2019 AIChE Spring meeting, March 31 - April 4, 2019.
476. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, (2018), "Local Hydrodynamics Characteristics of Cylindrical Split Airlift Reactor via Radioactive Particle Tracking (RPT) Technique" 2018 GCEAS, Global Conference on Engineering and Applied Science, July 10-12, Tokyo, Japan.
475. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, (2018), "Local Hydrodynamics Characteristics of Cylindrical Split Airlift Reactor via Radioactive Particle Tracking (RPT) Technique," AIChE '18, Oct 28- Nov 2, 2018
474. Aastha Ojha, Laith S. Sabri, Muthanna H. Al-Dahhan, (2018), "Characterization of Bubble Dynamics and Local Gas Holdup in a cylindrical Airlift Photobioreactor during Microalgae Culturing," AIChE '18, Oct 28- Nov 2, 2018
473. Abbas J. Sultan, Laith S. Sabri, Muthanna Al-Dahhan, (2018), "Influence of Heat Exchanging Dense Internals on the Flow Dynamics Parameters in Bubble Column with and without Internals via Radioactive Particle Tracking (RPT) Technique," AIChE '18, Oct 28- Nov 2, 2018
472. Omar J. Farid, Abbas Sultan, Laith Sabri, Weina Meng, Kamal Khayat, Muthanna H. Al-Dahhan, (2018), "Non-Invasive Imaging of Distribution of Coarse Aggregate in Hardened States Concrete Using Advanced Gamma Ray Computed Tomography," 2018 AIChE Annual meeting, Oct 28-Nov 2, 2018
471. Salman M Alshehri, Ibrahim A. Said, Muthanna H. Al-Dahhan, Shoaib Usman (2018), "Plenum-to-Plenum Natural Circulation Heat Transfer in a Prismatic Very-High Temperature Reactor for Different Coolants", The Advances in Thermal Hydraulics, American Nuclear Society Winter Meeting 2018, USA, Orlando.
470. Salman M Alshehri, Ibrahim A. Said, Muthanna H. Al-Dahhan, Shoaib Usman (2018), "Experimental Investigation on Heat Transfer in a Prismatic Modular Reactor under Cosine Heat Flux", The Advances in Thermal Hydraulics, American Nuclear Society Winter Meeting 2018, USA, Orlando.

469. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, (2018), “Characterization slit photobioreactor” 2018 Algae Biomass Summit, October 14-17, 2018. The Woodlands Waterway Marriott Hotel & Convention Center, the Woodlands (Greater Houston), Texas
468. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, (2018), “Characterization of Hydrodynamics for Split Photobioreactor via Radioactive Particle Tracking (RPT) Technique,” NETL - Multiphase Workshop comes to Houston - Aug 7-9, 2018
467. Muthanna H. Al-Dahhan, Laith S. Sabri, Premkumar Kamalanathan, Haider Taofeeq, Neven Ali, A. Efhaima, (2018), “Advancing Hydrodynamics and Scale-up of Gas-Solid Systems via Sophisticated Measurement Techniques” NETL - Multiphase Workshop comes to Houston - Aug 7-9, 2018
466. Muthanna Al-Dahhan, Hayder Alnaseri, Joshua Schlegel, (2018), The effect of Industrial Heat Exchanger Internals Structure on the Gas Holdup of Pilot Plant Bubble Column for Fischer Tropsch Synthesis, NETL - Multiphase Workshop comes to Houston - Aug 7-9, 2018.
465. Aastha Ojha, Laith S. Sabri, Muthanna H. Al-Dahhan, (2018), Estimating the local volumetric mass transfer coefficient for microalgae scenedesmus in a split airlift photobioeactor, NETL - Multiphase Workshop comes to Houston - Aug 7-9, 2018.
464. Aastha Ojha, Laith S. Sabri, Muthanna H. Al-Dahhan, (2018), Investigation of local gas holdup and bubble dynamics using four-point optical probe technique in a split-cylinder airlift reactor, NETL - Multiphase Workshop comes to Houston - Aug 7-9, 2018.
463. Salman Alshehri, I.A. Said, Muthanna Al-Dahhan, Shoaib Usman (2018) “Experimental Investigation of Plenum-to-Plenum Natural Circulation Heat Transfer in a Prismatic Very High-Temperature Reactor”, American Nuclear Society Annual Meeting 2018, USA, Philadelphia.
462. Salman Alshehri, I.A. Said, Muthanna Al-Dahhan, Shoaib Usman (2018), “Experimental Investigation on Heat Transfer Characteristics with Non-Uniform Heat Flux Distribution under Natural Circulation”, American Nuclear Society Annual Meeting 2018, USA, Philadelphia
461. Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan, (2018), “Study the Impact of Size of Heat-Exchanging Tubes on Liquid Velocity Field and Turbulent Parameters in Bubble Column for Fischer-Tropsch Synthesis Via Radioactive Particle Tracking (RPT) Technique,” International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2018), June 10-13,2018
460. Hayder Alnaseri, Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan, (2018),” CFD Simulation the Effect of Internal Configurations on the Bubble Column Dynamic of Fischer-Tropsch (FT) Synthesis,” International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2018), June 10-13,2018
459. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, (2018), “Local gas holdup Distributions in Cylindrical Split Airlift Reactor via Gamma-Ray Computed Tomography (CT) Technique” International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2018), June 10-13,2018
458. Mohammed Al-Ani and Muthanna Al-Dahhan, (2018), “Two-Phase Distribution Investigation in the Catalytic Trickle Bed Reactors (TBRs) Packed with Different Shape of Commercial Catalyst Particles,” International-Mexican Congress on Chemical Reaction Engineering (IMCCRE 2018), June 10-13,2018
457. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, (2018),” Split Airlift Photobioreactor For High-Value Microalgae Culturing: Characterization of Hydrodynamics By Using (RPT) And (CT),” 25th International Conference on Chemical Reaction Engineering, ISCRE25, May 20-30, 2018 Florence, Italy
456. Humayun Shariff and Muthanna Al-Dahhan, (2018), “Liquid Phase Ethylene Production by Hydrogenation of Acetylene: Kinetics and Multiscale Modeling,” 25th International Conference on Chemical Reaction Engineering, ISCRE25, May 20-30, 2018 Florence, Italy
455. Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan, (2018), ”Influence Of Bundle Of Heat Exchanging Tubes, Their Configuration, And Column Size On The Gas Holdup Distributions In Bubble Column Via Gamma-Ray Computed Tomography”, 25th International Conference on Chemical Reaction Engineering ISCRE25, May 20-30, 2018 Florence, Italy
454. Thaar Al-Juwaya, Neven Ali, Muthanna Al-Dahhan (2017). "Experimental Investigation of Solid Particles Flow in TRISO Spouted Bed Coaters with Binary Mixtures of Particles Using RPT." American Nuclear Society Winter Meeting and Nuclear Technology EXPO, Washington, DC October 29-November 2, 2017 (Transaction)

453. Laith S. Sabri, Abbas J. Sultan, Hayder Al-Naseri, Muthanna H. Al-Dahhan (2017), Integration of Experimental and Modeling for Evaluation of Microalgae Culturing in Split Airlift Photobioreactors, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
452. Laith S. Sabri, Abbas J. Sultan, Hayder Al-Naseri, Muthanna H. Al-Dahhan (2017), Radioactive Particle Tracking (RPT) Technique for Pilot-Scale Bubble Column, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
451. Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan (2017), Gamma-ray Computed Tomography (CT) Technique for Pilot-Scale Bubble Column Reactor, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
450. Mahmoud. M. Taha, Ibrahim. A. Said, Shoaib. Usman, and Muthanna H. Al-Dahhan (2017), Effect of cooling on natural circulation velocity and temperature measurements inside vertical heated channel representing Prismatic Modular Reactor Core, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
449. Laith S. Sabri, Abbas J. Sultan, Hayder Al-Naseri, Muthanna H. Al-Dahhan (2017), Local Flow Dynamics in Split Airlift Reactor (Experimental and Validation of CFD Simulations, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
448. Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan (2017), Experimental and CFD Simulation Study of Bubble Column Equipped with a Bundle of Heat Exchanging Tubes (Internals) for Fischer-Tropsch (FT) Synthesis, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
447. Humayun Shariff, Premkumar Kamalanathan, and Muthanna Al-Dahhan (2017) Residence Time Distribution Studies in a Laboratory Scale Trickle-Bed Reactor for Liquid Phase Hydrogenation of Acetylene, 2017 AIChE Annual meeting, Minneapolis, Minnesota, USA, October 29 – November 3
446. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan (2017), Hydrodynamic Measurements for Airlift Reactor via Non-invasive RPT and CT Techniques, 10th World Congress of Chemical Engineering, (WCCE 2017), Barcelona, Spain, October 1-5
445. Abbas J. Sultan, Laith S. Sabri, Muthanna H. Al-Dahhan (2017), Investigating the Impact of Bundle of Heat Exchanging Tubes (Internals) Size on the Hydrodynamics of Bubble Column for Fischer-Tropsch (FT) Synthesis by using Advanced Non-Invasive Techniques, 10th World Congress of Chemical Engineering, (WCCE 2017), Barcelona, Spain, October 1-5
444. Humayun Shariff and Muthanna Al-Dahhan (2017), Multi-Scale Modeling and Analysis of the Reactor Performance of Trickle Bed Reactors and Two-Phase Upflow Packed Bed Reactors, 10th World Congress of Chemical Engineering, (WCCE 2017), Barcelona, Spain, October 1-5
443. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan (2017), Analysis of Airlift Photobioreactor via Computed Tomography CT and Radioactive Tracking Techniques, 13th International Conference on Gas–Liquid and Gas–Liquid–Solid Reactor Engineering, (GLS-13), Brussels, Belgium, August 20-23
442. Hayder Al-Naseri, Joshua P. Schlegel, Muthanna Al-Dahhan, (2017), The effect of the solids loading on the local gas holdup in a pilot scale bubble column with industrial heat exchanger internals structure, 13th International Conference on Gas–Liquid and Gas–Liquid–Solid Reactor Engineering, (GLS-13), Brussels, Belgium, August 20-23
441. Abbas Sultan, Laith Sabri, Muthanna Al-Dahhan (2017), Imaging phase distribution in a bubble column equipped with intense heat exchanging tubes for Fischer-Tropsch (FT) synthesis via gamma-ray computed tomography (CT) technique, 13th International Conference on Gas–Liquid and Gas–Liquid–Solid Reactor Engineering, (GLS-13), Brussels, Belgium, August 20-23
440. Humayun Shariff and Muthanna Al-Dahhan (2017), Modeling of Catalytic Trickle Bed Reactors: Performance Analysis at Multi-scale Levels, The10th – International Symposium on Catalysis in Multiphase Reactors (CAMURE-10) and the 9th International Symposium on Multifunctional Reactors (ISMR-9), Qingdao, China, July 7-10
439. Vineet Alexander and Muthanna H. Al-Dahhan (2017), Liquid Mixing Behavior in Upflow Moving catalytic packed/expanded bed hydrotreating reactor using advanced measurement technique, The 10th – International Symposium on Catalysis in Multiphase Reactors (CAMURE-10) and the 9th International Symposium on Multifunctional Reactors (ISMR-9), Qingdao, China, July 7-10

438. Mohammed Al-Ani and Muthanna H. Al-Dahhan (2017), Identification of the Flow Regime Transition in Catalytic Trickle Bed Reactors (TBRs) Packed with Commercial Trilobe and Quadrilobe Extrudate Catalysts, The 10th – International Symposium on Catalysis in Multiphase Reactors (CAMURE-10) and the 9th International Symposium on Multifunctional Reactors (ISMR-9), Qingdao, China, July 7-10
437. Laith S. Sabri, Abbas J. Sultan, Muthanna H. Al-Dahhan, 2017, "Influence of Hydrodynamics of Multiphase Flow on Microalgae Cells' Movements and Irradiance Distributions by using Radioactive Particle Tracking (RPT) Technique ", The 7th International Conference on Algal Biomass, Biofuels and Bioproducts, Miami, June 11-13
436. Ibrahim. A. Said, Mahmoud. M. Taha, Shoaib. Usman, and Muthanna H. Al-Dahhan (2017), Experimental study on helium natural convection heat transfer for two coolant flow channels within Prismatic Very High Temperature Reactor, The American Nuclear Society (ANS) annual meeting, San Francisco, CA, USA, June 11-15
435. Humayun Shariff and Muthanna Al-Dahhan (2017), Modeling of Hydrotreating Trickle Bed Reactors: Performance Analysis at Multi-scale levels, International Symposium on Advances in Hydroprocessing of Oil Fractions, ISAHOF-2017, New Mexico, Mexico, June 4-7
434. Mohammed Al-Ani and Muthanna H. Al-Dahhan (2017), Flow Regime Transition Identification through Porous Trilobe Catalyst in Axial and Radial Directions in Trickle Bed Reactors (T.B.Rs.), International Symposium on Advances in Hydroprocessing of Oil Fractions, ISAHOF-2017, New Mexico, Mexico, June 4-7
433. Vineet Alexander and Muthanna H. Al-Dahhan (2017), Liquid Mixing Behavior of Gas-Liquid Upflow in Moving Catalytic Packed Bed or Slightly Expanded Hydrotreating Reactor using Advanced Liquid Tracer Technique, International Symposium on Advances in Hydroprocessing of Oil Fractions, ISAHOF-2017, New Mexico, Mexico, June 4-7
432. Sawasan Al-Basri, Nasser Zouli and Muthanna Al-Dahhan (2017), Removal of polar compounds from waste water by emulsion liquid membrane stabilized by the combination of surfactant and ionic liquid, 4th International Symposium on Innovation and Technology in the Phosphate Industry, Mohammed VI Polytechnic University, Mohammed VI Green City, Benguerir, Morocco, May 8-10
431. Muthanna Al-Dahhan, Vineet Alexander, Abbas Sultan, Laith Sabri, (2016), Hydrodynamics investigation using advanced measurement and computing techniques in gas-liquid-solid systems for performance evaluation and modeling, MATHIAS 2016, Total, Elysee Val d'Europe, Paris, France, October 26-28
430. Humayun Shariff and Muthanna Al-Dahhan (2016), Multi-scale modeling of trickle bed and two phase upflow packed bed reactors, MATHIAS 2016, Total, Elysee Val d'Europe, Paris, France, October 26-28
429. Humayun Shariff and Muthanna Al-Dahhan (2016), Kinetic Studies of Liquid Phase Ethylene Production by Hydrogenation of Acetylene Using a Selective Solvent in a Basket Reactor, Annual AIChE Meeting, San Francisco, CA, U.S.A, November 13-18
428. Humayun Shariff and Muthanna Al-Dahhan (2016), Reactor Scale Modeling of Liquid Phase Ethylene Production by Hydrogenation of Acetylene in a Trickle Bed Reactor, Annual AIChE Meeting, San Francisco, CA, U.S.A, November 13-18
427. Nasser Zouli and Muthanna Al-Dahhan (2016), Enhancement of heat transfer coefficient by using Fe2O3 water nanofluids, Annual AIChE Meeting, San Francisco, CA, USA, November 13-18
426. Haidar Taofeeq and Muthanna Al-Dahhan (2016), Scale-up of Fluidized Reactors Based on Chaos Analysis Approach and New Scale-up Methodology, Annual AIChE Meeting, San Francisco, CA, U.S.A, November 13-18
425. Haidar Taofeeq and Muthanna Al-Dahhan (2016), Studying the Effect of Vertical Internals on the Radial Pressure Drop in Fluidized Bed Using Probe-Differential Pressure Transducer, Annual AIChE Meeting, San Francisco, CA, U.S.A, November 13-18
424. Hayder Al-Naseri and Muthanna Al-Dahhan (2016), CFD Simulation for Bubble Column with and without Internals of Fischer Tropsch (FT) Synthesis, Annual AIChE Meeting, San Francisco, CA, U.S.A, November 13-18
423. Abbas J. Sultan, Laith S. Sabri, and Muthanna H. Al-Dahhan (2016), Visualization Phases Distributions in the Pilot-Scale Bubble Column with Internals Via γ-Ray Computed Tomography (CT), AIChE Annual Meeting, San Francisco, CA, U.S.A, November 13-18

422. Laith S. Sabri, Abbas J. Sultan and Muthanna H. Al-Dahhan (2016), Microalgae's Cells Mapping by Radioactive Particle Tracking (RPT), AIChE Annual Meeting, San Francisco, CA, U.S.A, November 13-18
421. Vineet Alexander, Hamza Al-Bazzaz, and Muthanna Al-Dahhan (2016), Gas phase mixing behavior of gas-liquid upflow in moving catalytic packed/Expanded bed hydroterating reactor using advanced gas tracer technique, AIChE Annual Meeting, San Francisco, CA, U.S.A, November 13-18
420. Muthanna Al-Dahhan and his students (2016), Sophisticated Measurement and Computing Techniques to Address Energy Issues, Midwest Energy Policy Conference, Saint Louis, MO, U.S.A, October 4-5
419. Abbas Sultan, Laith Salim, Muthanna Al-Dahhan (2016), Gas Holdup Distribution in Bubble Column with Heat Exchange Tubes (Internals) for Gas-to-Liquid (GTL) Technology as Alternative Energy, Midwest Energy Policy Conference, St. Louis, MO, U.S.A, October 4-5
418. Mohammed Al Mesfer, Abbas Sultan, Muthanna H. Al-Dahhan (2016), Study the Effect of Dense Internals on the Liquid Velocity Field and Turbulent Parameters of Bubble Column Using Radioactive Particle Tracking Technique (RPT), 8th World Congress on Industrial Process Tomography (WCIPT8), Foz de Lguacu, Brazil, September 26-29
417. Abbas J. Sultan, Laith S. Sabri, and Muthanna H. Al-Dahhan (2016), Investigating the Influence of Bundle of Heat Exchanger Tubes (internals) on the Gas Holdup Distributions in Pilot Scale Bubble Column with Internals for Fischer-Tropsch Synthesis (FT) Via Gamma-Ray Computed Tomography (CT) Technique, 8th World Congress on Industrial Process Tomography (WCIPT8), Foz de Lguacu, Brazil, September 26-29
416. Laith S. Sabri, Abbas J. Sultan and Muthanna H. Al-Dahhan (2016), Imaging and Visualization of phase distribution for Microalgae culturing in split photo bioreactor column via Gamma Ray Computed Tomography (CT), 8th World Congress on Industrial Process Tomography (WCIPT8), Foz de Lguacu, Brazil, September 26-29
415. Ali Toukan, Vineet Alexander, and Muthanna Al-Dahhan (2016), Liquid holdup studies in a cocurrent gas-liquid upflow moving packed bed reactor with porous catalyst using gamma ray densitometry, 8th World Congress on Industrial Process Tomography (WCIPT8), Foz de Lguacu, Brazil, September 26-29
414. Ali Toukan, Vineet Alexander, and Muthanna Al-Dahhan (2016), Flow regime identification in a cocurrent gas-liquid upflow moving packed beds reactor using gamma ray densitometry, 8th World Congress on Industrial Process Tomography (WCIPT8), Foz de Lguacu, Brazil, September 26-29
413 Hsu Chiang, Jeff Ferrio, Xiaoyun Chen, Kishar Kar, Joel Reihl, Michael Church, Dan Friedhoff, Muthanna Al-Dahhan, (2016, June 13), Dow Al-Dahhan cell for measuring intrinsic kinetics of a reaction in two-fluid-phase system, 24th International Symposium on Chemical Reaction Engineering (ISCRE24), Minneapolis Minnesota, U.S.A, June 12-15
412. Abbas Sultan, Laith Sabri, and Muthanna, Al-Dahhan (2016), Investigating the effect of heat exchange tubes size on phase distribution of bubble columns for Fischer Tropsch synthesis by using Gamma Ray Computed Tomography (CT) Technique, 24th International Symposium on Chemical Reaction Engineering (ISCRE24), Minneapolis Minnesota, U.S.A, June 12-15
411. I.A. Said, M.M. Taha, S. Usman and Muthanna Al-Dahhan (2016), Investigation of free convection heat transfer in Missouri S&T prismatic scaled down facility (MOST), 24thInternational Symposium on Chemical Reaction Engineering (ISCRE24), Minneapolis Minnesota, U.S.A, June 12-15
410. Thaar Aljuwaya and Muthanna Al-Dahhan (2016), Measurement of phase cross section distribution in gas-solid spouted bed via gamma ray computed tomography (CT), 24th International Symposium on Chemical Reaction Engineering (ISCRE24), Minneapolis Minnesota, U.S.A, June 12-15
409. Ali Toukan, Vineet Alexander, and Muthanna Al-Dahhan (2016), Flow regime identification in a gas-liquid upflow moving packed beds reactor using gamma ray densitometry, International Mexican Congress on Chemical Reaction Engineering (IMCCR 2016), Queretaro, Mexico, June 5-9
408. Ali Toukan, Vineet Alexander, and Muthanna Al-Dahhan, (2016), Liquid holdup studies in a gas-liquid upflow moving packed bed reactor with porous catalyst using gamma ray densitometry,

International Mexican Congress on Chemical Reaction Engineering (IMCCR 2016), Queretaro, Mexico, June 5-9

407. Aastha Ojah and Muthanna H. Al-Dahhan, (2016) Bubble dynamics and mass transfer during culturing microalgae in split photo bioreactor column, International Mexican Congress on Chemical Reaction Engineering (IMCCR 2016), Queretaro, Mexico, June 5-9
406. Abbas J. Sultan, Laith S. Sabri, and Muthanna H. Al-Dahhan (2016), Investigating the impact of vertical internals on the gas holdup distributions in pilot scale bubble column for Fischer-Tropsch synthesis via gamma-ray computed tomography (CT) technique, International-Mexican Congress on Chemical Reaction Engineering (IMCCR 2016), Queretaro, Mexico June 5-9
405. Abdulsalam Efheima, Muthanna Al-Dahhan (2016) Assessment of a new mechanistic scale-up methodology of gas-solid fluidized beds using CT and RPT techniques, ECI-Fluidization XV Conference, Quebec, Canada, May 22-27
404. Shreekanta Aradhya, Haider Taofeeq, Muthanna Al-Dahhan (2016) Effect of design and operating variables on spout diameter of spouted beds using factorial design of experiments approach with the aid of new optical fiber probe, ECI-Fluidization XV Conference, Quebec, Canada, May 22-27
403. Haider Taofeeq and Muthanna Al-Dahhan (2016) Flow regime identification in fluidized beds by analyzing pressure fluctuations signal based on Kolmogorov entropy approach, ECI-Fluidization XV Conference, Quebec, Canada, May 22-27
402. Muthanna Al-Dahhan and the Students, (2016) Benchmarking CFD and new mechanistic approach for enabling scale-up of multiphase reactors via sophisticated measurement and computing techniques, 9th International Conference on Multiphase Flow, Firenze, Italy, May 22-27
401. Scott Marchetti, I.A. Said, M. M. Taha, S. Usman, and Muthanna H. Al Dahhan, (2016), Development of Missouri S&T Prismatic Scaled Down Facility for Natural Circulation Thermal Hydraulics Investigations, 12 the Annual Missouri S&T Undergraduate Research Conference, Missouri University of Science and Technology, Rolla, Missouri, April 11
400. Austin Fischer, Cesar Ramirez, I.A. Said, M. M. Taha, S. Usman, and Muthanna H. Al Dahhan, (2016), Natural Convection in Missouri S&T Prismatic Scaled Down Facility Subject to Constant Heat Flux, 12 th Annual Missouri S&T Undergraduate Research Conference, Missouri University of Science and Technology, Rolla, Missouri, April 11
399. Francisco Neto, Nasser Zouli, and Muthanna H. Al Dahhan, (2016), Treatment performance of oily wastewater using ceramic membranes, 12th Annual Missouri S&T Undergraduate Research Conference, Missouri University of Science and Technology, Rolla, Missouri, April 11
398. Stiles Jackson, Mohamed Al-Ani, and Muthanna H. Al Dahhan, (2016), Hydrodynamics in Trickle Bed Reactor, 12th Annual Missouri S&T Undergraduate Research Conference, Missouri University of Science and Technology, Rolla, Missouri, April 11, 2016.
397. Vineet Alexander, Hamza Al-Bazzaz, and Muthanna Al-Dahhan (2016) Gas phase mixing behavior of gas-liquid upflow in moving catalytic packed bed hydroterating reactor using advanced gas tracer technique, AIChE Midwest Regional Conference, Chicago, IL, March 3-4
396. Hayder Al-Naseri and Muthanna Al-Dahhan (2016) Bubble Dynamic Properties in Low Heights Industrial Bubble Column with Internal by Using Four-Point Optical Fiber Probe Technique, AIChE Midwest Regional Conference, Chicago, IL, March 3-4
395. M. M. Taha, I. A. Said, S. Usman, and M. H. Al-Dahhan (2016) Passive safety systems in nuclear reactors – heat transfer natural circulation in Missouri S&T Prismatic scaled-down Dual Channel Facility", Missouri University of Science and Technology showcase presentations, Rolla, MO, March 16th
394. Vineet Alexander, Hamza Al-Bazzaz, and Muthanna Al-Dahhan (2016) Statistical and chaotic time series analysis approach to determine and to monitor flow regime in upflow moving packed bed hydrotreater reactor using gamma ray densitometry. 6th TRC JCCP/IDEMITSU (TAKREER), Abu Dhabi, UAE, February 10 -11
393. Fitri, V. Alexander, M. Al-Dahhan (2016), Flow Regimes Identification in Trickle Bed reactors Using Gamma ray densitometry, 6th TRC JCCP/IDEMITSU (TAKREER), Abu Dhabi, UAE, February 10 -11

392. Vineet Alexander, Hamza Al-Bazzaz, and Muthanna Al-Dahhan (2015) Phase distribution, local maldistribution and back mixing behavior identification in upflow hydrotreater reactor using two tip optical probe. AIChE Annual Meeting, Salt Lake City, UT, November 8 – 13
391. Vineet Alexander, Hamza Al-Bazzaz, and Muthanna Al-Dahhan (2015) Gas mixing behavior studies in upflow moving packed bed hydrotreating reactor using developed gas tracer technique for multiphase systems AIChE Annual Meeting, Salt Lake City, UT, November 8 – 13
390. Abdelsalam Efhaima and Muthanna H. Al-Dahhan (2015) Assessment of Scale-up Dimensionless groups Methodology of gas-solid Fluidized beds using advanced non-invasive measurement techniques (CT & RPT), AIChE Annual Meeting, Salt Lake City, UT, November 8 – 13
389. M. M. Kao, P. Jain, I.A. Said , M. M. Taha, S. Usman; Muthanna H. Al Dahhan and Rizwan-Uddin (2015) Studding Plenum to Plenum (P2P) Natural Circulation Phenomena in a Dual Channel Scaled Module of VHTR Design by Using the CFD, AIChE Annual Meeting, Salt Lake City, UT, November 8 – 13
388. I. A. Said, M. M. Taha, S. Usman, and Muthanna H. Al Dahhan (2015) Experimental and Computational Investigations of Plenum-to-Plenum Heat Transfer and Gas Dynamics Under Natural Circulation in a Prismatic Very High Temperature Reactor, AIChE Annual Meeting, Salt Lake City, UT, November 8 – 13
387. Ahmed Jasim and Muthanna Al-Dahhan (2015) Impact of configuration of Heat Exchanging Internals on Symmetric Behavior of Bubble Dynamics of a Bubble Column, AIChE Annual Meeting, Salt Lake City, UT, November 8 – 13
386. Neven Ali, Thaar Al-Juwaya, and Muthanna Al-Dahhan (2015) Non-invasive measurement of the 3D particle velocity and turbulent parameters fields of gas-solid spouted beds by means of radioactive particle tracking (RPT), 7th International Symposium on Process Tomography, The Westin Bellevue, Dresden, Germany, September 1 - 3
385. Neven Ali, Thaar Al-Juwaya, and Muthanna Al-Dahhan (2015) Non-destructive measurement of phase cross section distribution in gas-solid spouted bed via gamma ray computed tomography (CT), 7th International Symposium on Process Tomography, The Westin Bellevue, Dresden, Germany, September 1 - 3
384. M. M. Kao , I.A. Said, M. M. Taha , S. Usman , P. Jain , Muthanna H. Al Dahhan , Rizwan-Uddin (2015) Investigation of Plenum-to-Plenum Heat Transfer and Ga Dynamics under Natural Circulation in a Scaled down Dual Channel Module Mimicking Prismatic VHTR Core with using CFD,16th International Topic Meeting On Nuclear Reactor Thermal Hydraulics, Hyatt Regency Chicago, IL , Aug30 – Sept 4
383. N.I. Zouli and M. H. Al-Dahhan (2015) Enhancement of heat transfer coefficient by using nanoparticles for desalination plants, 2nd International Conference on Desalination Using Membrane Technology, Singapore, July 26-29
382. Vineet Alexander, Mohd Fitri Abdul Rahman, Hamza Al-Bazzaz and Muthanna Al-Dahhan (2015) Phase distribution, Local Maldistribution and Back Mixing Behavior using two tip optical probe and statistical/chaotic time series analysis approach to determine and to on-line monitor local flow using gamma ray densitometry in upflow moving packed bed hydrotreating reactor, 12th International conference on gas-liquid and gas liquid solid reactor engineering (GLS12), New work, June28-July1
381. Ahmed Jasim, A. Sultan and Muthanna Al-Dahhan (2015) Impact of internals and their height from gas distributor on gas holdup and bubble dynamics in a bubble column, 12th International conference on gas-liquid and gas liquid solid reactor engineering (GLS12), New work, June28-July1
380. Neven Yousif Ali, Thaar, M. Aljuwaya, and Muthanna H. Al-Dahhan (2015) Detailed 3D Solids Dynamics of Gas-Solid Spouted Beds Using Gamma Ray Computed Tomography (CT) and Radioactive Particle Tracking (RPT) Techniques, ANS 2015 Annual Meeting, Grand Hyatt San Antonio, San Antonio, TX, June 7 – 11
379. I.A. Said, M. M. Taha, S. Usman, and Muthanna H. Al Dahhan (2015) Plenum-to-Plenum Heat Transfer and Gas Dynamics, 2015 Graduate Research Showcase, Missouri University of Science and Technology, Rolla, Missouri, April 1st

378. Ghanim M. Alwan and Muthanna M. Al-Dahhan (2014) Implementation of advanced genetic Algorithm to optimize the performance of a spouted bed based on distribution of solid particles, Circulating Fluidized Beds and Measurement Techniques in Fluid-Particle Systems, 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21
377. Aastha Ojha and Muthanna Al Dahhan (2014) Study of Local Bubble Dynamics and Mass Transfer in a Split Column Airlift Photo bioreactor for Culturing Microalgae for CO2 Sequestration Using a Sophisticated 4-Point Optical Probe Technique, CO2 Capture and Sequestration, 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21
376. Abdelsalam Efhaima and Muthanna Al Dahhan (2014) Bed Height and Material Density Effects on Local Time -Average Gas Holdup in Fluidized Bed Reactor, Multiphase Reaction Engineering I, 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21
375. Vineet Alexander, Hamza Al-Bazaz and Muthanna H. Al-Dahhan (2014) Flow Regime Identification in Moving Bed Upflow Hydrotreating Reactor by Gamma Ray Densitometry, Multiphase Reaction Engineering I, 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21
374. Mohd Fitri Abdul Rahman, Khairul Anuar Mohd Salleh and Muthanna H. Al Dahhan (2014) Mohd Fitri Abdul Rahman, Khairul Anuar Mohd Salleh and Muthanna H. Al Dahhan, Multiphase Reaction Engineering II, 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21
373. Abdelsalam Efhaima, and Muthanna H. Al Dahhan (2014) Superficial Gas Velocity Effects on local time-averaged phase holdup in Fluidized Bed Reactor using Gamma Ray Computed Tomography Technique (CT), 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21
372. Rahman Abdulmohsin and Muthanna H. Al-Dahhan (2014) Characteristics of Convective Heat Transfer in a Packed Pebble-bed Reactor Using Novel Fast-response and Noninvasive Heat Transfer Probe of Spherical Shape. International Symposium on Chemical Reaction Engineering (ISCRE 23) and Asia Pacific Chemical Reaction Engineering (APCRE 7), Bangkok, Thailand, September 7-10.
371. Moses Kagumba and Muthanna Al-Dahhan (2014) Combined Heat Transfer and Bubble Dynamics: A Mechanistic Approach, ISCRE 23 and APCRE 7, Bangkok, Thailand, September 7-10
370. Shreekanta B. Aradhya and Muthanna H. Al-Dahhan (2014) New scale-up methodology for gas-solid spouted beds based on maintaining similar hydrodynamic profiles, International Symposium on Chemical Reaction Engineering (ISCRE 23) and Asia Pacific Chemical Reaction Engineering (APCRE 7), Bangkok, Thailand, September 7-10
369. Mohd Fitri Abdul Rahman, Shaker Ebrahim and Muthanna Al-Dahhan (2014) Flow regime identification in trickle bed reactors by gamma ray densitometry, 5th International Workshop on Process Tomography, Jeju, South Korea, September 16-18
368. Mohammed Al Mesfer and Al-Dahhan, Muthanna (2014) Investigation of the Impact of Dense Vertical Internals on Hydrodynamics in Bubble Column Reactors Using Advanced Measurement Techniques, 8th International Conference of Isotopes, Chicago, IL, August 24-28
367. Abdelsalam Efhaima and Al-Dahhan, Muthanna H (2014) Local Time-Averaged Gas Holdup in Fluidized Bed Reactor Using Gamma Ray Computed Tomography Technique, 8th International Conference of Isotopes, Chicago, IL, August 24-28
366. Mohd Fitri Abdul Rahman, Vineet Alexander, Hamza Al-Bazzaz, Omar Al-Baloshi, Shaker Ibrahim, Ali Toukan, Muthanna Al-Dahhan (2014) Flow regime identification in a moving bed upflow hydrotreating reactor by gamma ray densitometry, International Mexican Congress on Chemical Reaction Engineering, IMCCRE 2014, Acapulco, Mexico, June, 7-13
365. Mohd Fitri Abdul Rahman, Vineet Alexander, Hamza Al-Bazzaz, Muthanna Al-Dahhan (2014) Phase distribution in a moving bed upflow hydrotreating reactor by gamma ray densitometry, International Mexican Congress on Chemical Reaction Engineering, IMCCRE 2014, Acapulco, Mexico, June, 7-13
364. Vineet Alexander, Mohd Fitri Abdul Rahman, Hamza Al-Bazzaz, Muthanna Al-Dahhan (2014) Flow regime identification in a moving bed reactor by gamma ray densitometry, 3rd Kuwait Conference of Chemistry, KCC2014, Kuwait, March 9-11
363. Mohamed Al-Mesfer, Muthanna Al-Dahhan (2014) Effect of dense heat exchanging internals on the hydrodynamics of bubble column reactors using non-invasive measurement techniques, 3rd Kuwait Conference of Chemistry, KCC2014, Kuwait, March 9-11

362. Khairul Anuar Mohd Salleh, Hyoung Koo Lee, Muthanna Al-Dahhan (2014) Digital industrial X-ray radiography (DIR) application on local liquid velocity measurement in trickle bed reactors, 3rd Kuwait Conference of Chemistry, KCC2014, Kuwait, March 9-11
361. Aastha Ojha, Amer Albidiri, Muthanna Al-Dahhan (2014) local bubble dynamics and mass transfer study using a sophisticated 4-point optical fiber probe techniques in a split column airlift photobioreactor for treating refineries flue gas, 3rd Kuwait Conference of Chemistry, KCC2014, Kuwait, March 9-11
360. Rahman Shnain Abdulmohsin, Muthanna H. Al-Dahhan (2013) Characteristics of Flow and Convective Heat Transfer in a Packed Pebble-Bed Reactor, 2013 American Nuclear Society Winter Meeting and Nuclear Technology Expo, Washington, DC, November 10-14
359. Neven Yousif Ali, Thaar Mohammad Al-Juwaya, Muthanna Al-Dahhan (2013) Effects of operating and design variables on the phases' distribution using Gamma Ray Computed Tomography (CT) of spouted beds, 2013 American Nuclear Society Winter Meeting and Nuclear Technology Expo, Washington, DC, November 10-14
358. Vaibhav Khane, Muthanna H. Al-Dahhan (2013) Experimental and Computational Study of Slow and Dense Granular Flow in a Pebble Bed Reactor, 8980, 2013 American Nuclear Society Winter Meeting and Nuclear Technology Expo, Washington, DC, November 10-14
357. Khairul Anuar Mohd Salleh, Hyoung Koo Lee, Muthanna H. Al-Dahhan (2013), New local liquid velocity measurement technique in Trickle Bed Reactors (TBRs) using X-ray Digital Industrial Radiography and Particle Tracking (DRPT) techniques, 9444, 2013 American Nuclear Society Winter Meeting and Nuclear Technology Expo, Washington, DC, November 10-14, 2013
356. Vaibhav Khane and Muthanna Al-Dahhan (2013) Experimental and Computational Investigation of Slow and Dense Granular Flow in Moving/Pebble Bed Type Reactors, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
355. Mohd Fitri Abdul Rahman, Muthanna H. Al-Dahhan and Shaker Ebrahim (2013) Flow Regime Identification in Trickle Bed Reactor by Gamma Densitometry, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
354. Rahman Abdulmohsin, Muthanna Al-Dahhan (2013) Characteristics of Flow and Heat Transport in a Packed Pebble-Bed Reactor, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
353. Faraj M. Zaid and Muthanna H. Al-Dahhan (2013) Flow Regimes Transition and On-Line Monitoring of Gas-Solid Fluidized Bed, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
352. Moses Kagumba and Muthanna H. Al-Dahhan (2013) Impact of Internals Size and Configuration on Bubble Dynamics in Bubble Columns, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
351. Mohammed Al-Mesfer and Muthanna Al-Dahhan (2013) Investigation of the Impact of Dense Heat Exchanging Internals on Hydrodynamics in Bubble Column Reactors, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
350. Ali Neven, Thaar Al-Juwaya, Muthanna Al-Dahhan (2013) Effect Of Bed Size, Particles Properties and Gas Velocity On The Phases Distributions Of Gas-Solid Spouted Beds Using Gamma Ray Computed Tomography, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
349. Aastha Ojha, Amer Zmat, Muthanna Al-Dahhan (2013) Study of Local Gas Holdup, and Specific Interfacial Area in a Split-Column Airlift Bioreactor for Culturing Microalgae/Cyanobacteria, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
348. Khairul Anuar Mohd Salleh, Hyoung Koo Lee, and Muthanna H. Al-Dahhan (2013) Development of a New Liquid Velocity Measurement Technique in Trickle Bed Reactors (TBRs) Using Combined Digital Radiography and Particle Tracking (DRPT) Techniques, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
347. Moses Kagumba and Muthanna H. Al-Dahhan (2013) Contact Time for Mechanistic Modeling of Heat Transfer Coefficient in Slurry Bubble Columns, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8
346. Sai Abhishek, Moses Kagumba and Muthanna H. Al-Dahhan (2013) Radial Variation of Local Gas Holdup In a Bubble Column Reactor With Heat Exchanging Internals Using Four Point Optical Probe, 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8

345. Neven Y. Ali, and Thaar Aljuwaya, Muthanna Al-Dahhan, (2013), Effect of bed size and gas velocity on the phases distributions of gas-solid spouted beds using gamma ray computer tomography (CT), Fluidization XIV: From Fundamentals to Products, The Netherlands, Noordwijikerthout, May 26-31
344. Abdulmohsin, R., and Al-Dahhan, M., (2013), Gas dynamics and heat transfer in the core of a pebble bed reactor for the 4th generation nuclear energy, 3rd North American Symposium on Chemical Reaction Engineering (NASCRE-3), Houston, Texas, March 17-20
343. Abdulmohsin, R., and Al-Dahhan, M., (2012), Axial gas dispersion in the core of a pebble bed reactor for the 4th generation nuclear energy, 22nd International Symposium on Chemical Reaction Engineering (ISCRE 22), September 2-5, 2012 in Maastricht, the Netherlands
342. Abdulmohsin, R., and Al-Dahhan, M., (2012), Heat transfer coefficient in a randomly packed pebble bed for the 4th generation nuclear energy, 22nd International Symposium on Chemical Reaction Engineering (ISCRE 22), September 2-5, 2012 in Maastricht, the Netherlands
341. Rahman S. Abdulmohsina and Muthanna H. Al-Dahhan, (2012), Characteristics of Heat Transfer in a Packed Pebble-Bed Reactor, ANS-2012 Winter Meeting, San Diego, CA, November 11 -15
340. Vaibhav Khane and Muthanna H. Al-Dahhan, (2012), Study of Pebbles Residence Time Distributions in a Pebble Bed Test Reactor, ANS-2012 Winter Meeting, San Diego, CA, November 11 -15
339. Vaibhav Khane, Sfurti Ruge and Muthanna H. Al-Dahhan, (2012), Development of Cross-Correlation Based Position Reconstruction Algorithm for Radioactive Particle Tracking Technique, ANS-2012 Winter Meeting, San Diego, CA, November 11 -15
338. Moses Kagumba, Parthasakha Neogi and Muthanna Al-Dahhan, (2012), Combined Heat Transfer Coefficient and Bubble Dynamics Measurements in Bubble Columns: Assessment of a Mechanistic Approach, AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
337. Moses Kagumba, Yasser Abdulaziz, and Muthanna Al-Dahhan, (2012), The Effect of Internals and Solids Loading On the Bubble Dynamics in a Slurry Bubble Column, AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
336. Vaibhav Khane, G.E. Mueller, and M.H. Al-Dahhan, (2012), Parametric Sensitivity Study of Interaction Properties for Simulation of Realistic Packed Bed Structures, AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
335. Christine Meitzner, Erik Reichelt, Muthanna Al-Dahhan and Ruediger Lange, (2012), A Comparative Study On Bubble Velocity in Mini Channels, AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
334. Faraj Zaid, and Muthanna H. Al-Dahhan, (2012), Studying the Effects of Fluidized Bed Scale On the Solid Dynamics Using Sophisticated Optical Probe, AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
333. Faraj Zaid, and Muthanna H. Al-Dahhan, (2012), Effect of Fluidized Bed Scale and Bed Height on Flow Regimes Transition Using Optical probe and Pressure Transducer Measurements, AIChE-2012 Annual Meeting, October 28-November 2, 2012, Pittsburg, PA
332. M. Al Mesfer, P. Neogi and M.H. Al-Dahhan, (2012), Investigation of the Effect of Internals on Hydrodynamics in Bubble Column Reactors Using Computed Tomography (CT), AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
331. Abdulmohsin, R., and Al-Dahhan, M., (2012), Characteristics of flow in a packed pebble-bed reactor, AIChE Annual Meeting, October 28th-November 2nd, Pittsburgh, PA
330. Shreekanta Aradhya, Ghanim Alwan and M. H. Al-Dahhan, (2012), Study of Solids and Gas Distribution in Spouted Bed Operated in Stable and Unstable Conditions, AIChE-2012 Annual Meeting, October 28-November 2, Pittsburg, PA
329. Mehul Vesvikar, Muthanna Al-Dahhan, (2012), Development, validation and implementation of multiple radioactive particle tracking (MRPT), 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
328. Fadha Ahmed, Mohammed Al-Mesfer, Muthanna Al-Dahhan, (2012), Bed structure characterization of pebble bed reactor using gamma ray tomography, 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
327. P. A. S. Vasquez, R. Varma, M. M. Hamada, C. Henrique De Mesquita, M. H. Al-Dahhan, (2012), Image reconstruction algorithms applied to polyenergetic gamma ray tomography for large

systems, 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28

326. Mohammed Al-Mesfer, Fadha Ahmed, P. Neogi, Muthanna Al-Dahhan, (2012), Effect of Internals on gas holdup in bubble columns using computed tomography (CT), 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
325. S. Nedeltchev, F. Ahmed, A. Shaikh and M. Al-Dahhan, (2012), Effect of Scintillation Detector Position on Flow Regime Boundaries in Different Multiphase Reactors Based On Information Entropy, Nuclear Gauge Densitometry and Computed Tomography Scans, 6th International Symposium on Process Tomography, Cape Town (South Africa), March 25-28
324. Shreekanta Aradhya, M. H. Al-Dahhan, (2012), A New Methodology for Optical Probe Calibration and Validation with Computed Tomography in Spouted Beds, presented at 6th International Symposium on Process Tomography, Cape Town, South Africa, March 26-28
323. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2012), Study of Solids Dynamics in Moving Bed Reactor using Radioactive Particle Tracking (RPT) Technique, 6th International Symposium on Process Tomography, Cape Town, South Africa, March 26-28
322. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2011), Pebble Bed Reactor as Static Packed Bed, American Nuclear Society (ANS) Winter Meeting, Washington D.C., Oct.30th - Nov.3rd
321. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2011), Discrete Element Method Based Simulation of Pebble Bed Test Reactor, American Nuclear Society (ANS) Winter Meeting, Washington D.C., Oct. 30th - Nov.3rd
320. Herbig, T. Khane, V., Mueller, G.E., Al-Dahhan M.H., (2011), Determination of Interaction Parameters for EDEM Based Simulations of Pebble Bed Test Reactor, American Nuclear Society (ANS) Winter meeting, Washington D.C., Oct.30th - Nov.3rd
319. Vaibhav Khane, G.E. Mueller, and M.H. Al-Dahhan, (2011), Continuation of Experts in Discrete Element Modeling (EDEM) Validation for Packed Bed Structural Properties, AIChE-2011 Annual Meeting, October 2011, Minnesota
318. Gahnim M. Alwan, Muthanna Al-Dahhan, (2011), Simulation and multi-objective optimization of a continuous biochemical reactor using multilayer modeling technique, AIChE-2011 Annual Meeting, October 16-21, Minnesota
317. Gahnim M. Alwan, Muthanna Al-Dahhan, (2011), Multi-objective optimization of autothermal catalytic membrane reactor using genetic algorithm, AIChE-2011 Annual Meeting, October 16-21, Minnesota
316. S. Nedeltchev, A. Shaikh, F. Ahmed and M. Al-Dahhan, (2011), Combining Chaos Analysis, Information Entropy Theory and Radioactive Techniques for Flow Regime Identification in Both Bubble Columns and Fluidized Beds, Gas-Liquid and Gas-Liquid-Solid Reactor Engineering Congress (GLS10), Braga (Portugal), June 26-29
315. S. Nedeltchev, M. Kagumba and M. Al-Dahhan, (2011), Flow Regime Identification in a Bubble Column with a Conically-Shaped Inlet Based On Optical Probe Data and Different Entropies, First International Symposium on Multi-scale Multiphase Process Engineering (MMPE), Kanazawa city, Ishikawa Prefecture (Japan), October 4-7
314. G. M. Alwan, S. Nedeltchev, S. Aradhya and M. Al-Dahhan, (2011), Multi-objective Optimization of a Spouted Bed Reactor," 2011 AIChE Annual Meeting, Minneapolis, Minnesota (USA), October 16-21
313. S. Nedeltchev and M. Al-Dahhan, (2011), Characterization of the Degree of Turbulence in Bubble Columns Based On Chaos Analysis of CARPT Data, 2011 AIChE Annual Meeting, Minneapolis, Minnesota (USA), October 16-21
312. Abdulmohsin, R., and Al-Dahhan, M., (2011), Axial gas dispersion and heat transfer coefficient in a pebble bed reactor" ANS Winter Meeting and Nuclear Technology Expo, Oct.30th - Nov.3rd, 2011, Washington, DC, USA
311. Abdulmohsin, R., and Al-Dahhan, M., (2011), Effect of pebble sizes on axial gas dispersion in a pebble bed" AIChE Annual Meeting, October 16-21, 2011 at Minneapolis, Minnesota, USA
310. Abdulmohsin, R., and Al-Dahhan, M., (2011), Local time-averaged heat transfer coefficient in a pebble bed, AIChE Annual Meeting, October 16-21, 2011 at Minneapolis, Minnesota, USA
309. Abdulmohsin, R., and Al-Dahhan, M., (2011), Axial gas dispersion in a pebble bed reactor: effect of pebble size, American Nuclear Society (ANS) Annual Meeting, June 26-30, 2011 at Hollywood, Florida, USA

308. Abdulmohsin, R., Ali, N. and Al-Dahhan, M., (2011), Heat transfer coefficient in a pebble bed reactor (PBR)" ANS Annual Meeting, June 26-30, 2011 at Hollywood, Florida, USA
307. Abdulmohsin, R., Abid, B., and Al-Dahhan, M., (2011), Effect of scale-up on the heat transfer coefficient and rate in bubble columns" AIChE Spring National Meeting and 7th Global Congress on Process Safety, March 13-17, 2011 at Chicago, Illinois, USA
306. Abdulmohsin, R., Naida, A., and Al-Dahhan, M., (2011), Gas dynamics and heat transfer of pebble bed reactor (PBR) for the 4th generation nuclear energy, The Graduate Research Showcase, April 11, at Missouri S&T
305. Faraj Zaid, Stoyan Nedeltchev and Muthanna H. Al-Dahhan, (2011), Regime Transitions in a Fluidized Bed Based On Analyses of Gauge Pressure Fluctuations, ANS Annual Meeting, Hollywood, Florida, June 26-30
304. S. Nedeltchev, S. Aradhya, F. Zaid and M. Al-Dahhan, (2011), Flow Regime Identification in Both Spouted and Fluidized Beds Based on Different Entropies Derived from Gauge Pressure Fluctuations," First International Symposium on Multi-scale Multiphase Process Engineering (MMPE), Kanazawa city, Ishikawa Prefecture (Japan), October 4-7
303. Faraj Zaid, Stoyan Nedeltchev and Muthanna H. Al-Dahhan, (2011), Investigation of the Effect of Fluidized Bed Scale On the Solid Dynamics Using Sophisticated Optical Probe, 2011 AIChE Annual Meeting) Minneapolis, MN October 16-21
302. Faraj Zaid, Stoyan Nedeltchev and Muthanna H. Al-Dahhan, (2011), Flow regime Identification In Fluidized Beds Based on Statistical Analysis of Both Pressure Fluctuations and Optical Probe Data, 2011 AIChE Annual Meeting) Minneapolis, MN, October 16-21
301. S. Nedeltchev, S. Aradhya, F. Zaid and M. Al-Dahhan, (2011), Flow Regime Identification in Different Two-Phase Reactors Based on Extraction of Various Entropies from Gauge Pressure Fluctuations, 2011 AIChE Annual Meeting, Minneapolis, Minnesota (USA), October 16-21
300. S. Aradhya, X. Lan, M. H. Al-Dahhan, (2011), CFD Evaluation for Different Match and Mismatch Conditions for operating Spouted Beds, presented at ANS Winter Meeting, Las Vegas, Nevada, Nov. 7-11
299. S. Aradhya, X. Lan, M. H. Al-Dahhan, (2011), Assessing the Scale-up Methodology Based on Dimensional Analysis for Spouted Beds – a Comparison between Optical Probes and CFD, presented at ANS Annual Meeting, Hollywood, Florida, Jun. 26-30
298. S. Nedeltchev, S. Aradhya, F. Zaid, M. H. Al-Dahhan, (2011), Flow Regime Identification in Both Spouted and Fluidized Beds Based on Different Entropies Derived from Gauge Pressure Fluctuations", accepted at 1st International Symposium on Multi-scale Multiphase Process Engineering (MMPE), Kanazawa, Japan, Oct. 4-7
297. S. Aradhya, M. H. Al-Dahhan, (2011), Comparative Study of Spouted Bed Hydrodynamics Based on Dimensionless Approach using Optical Probes and CFD, AIChE Annual Meeting, Minneapolis, MN, Oct. 16-21
296. S. Aradhya, M. H. Al-Dahhan, (2011), Study of Effect of Design and Operating Conditions on Spouted Bed Hydrodynamics, AIChE Annual Meeting, Minneapolis, MN, Oct. 16-21
295. Rao V.M., Abdulghani A.J, Rojas J.V., Al-Dahhan M., Toshkov S., Castano C.H., (2011), Multi-walled Carbon Nanotubes Decorated with Va and Ni by Gamma Irradiation, Materials Science & Technology, Columbus, Ohio, October 2011
294. Rao V.M., Abdulghani A.J, Rojas J.V., Al-Dahhan M., Toshkov S., Castano C.H., (2011), Synthesis of Nickel Vanadium and Palladium Nanoparticles supported on Multi-Walled Carbon Nanotubes by Gamma Irradiation, Nan frontiers, Missouri State University, Springfield, Missouri, October 2011
293. S. Nedeltchev, A. Shaikh, F. Ahmed and M. Al-Dahhan (2011) Combining Chaos Analysis, Information Entropy Theory and Radioactive Techniques for Flow Regime Mapping in Both Bubble Columns and Fluidized Beds, Gas-Liquid and Gas-Liquid-Solid Reactor Engineering Congress (GLS10), Braga (Portugal), June 26-29
292. S. Aradhya, M. H. Al-Dahhan, (2011) Assessing the Scale-up Methodology Based on Dimensional Analysis for Spouted Beds, American Nuclear Society (ANS) 2011 Annual Meeting, "Seizing the Opportunity: Nuclear 's Bright Future", June 26-30, 2011, Hollywood, Florida
291. S. Abdulmohsin, M. H. Al-Dahhan, (2011) Axial Dispersion in a Pebble Bed Reactor: Effect of Pebble Size, American Nuclear Society (ANS) 2011 Annual Meeting, "Seizing the Opportunity: Nuclear's Bright Future", June 26-30, 2011, Hollywood, Florida

290. R. S. Abdulmohsin, N. Ali, M. H. Al-Dahhan, (2011) Heat Transfer Coefficient in a Pebble Bed Reactor, American Nuclear Society (ANS) 2011 Annual Meeting, “Seizing the Opportunity: Nuclear‘s Bright Future”, June 26-30, 2011, Hollywood, Florida
289. Abdulmohsin, R., Abid, B., and Al-Dahhan, M. (2011) Effect of scale-up on the heat transfer coefficient and rate in bubble columns, AIChE Spring National Meeting and 7th Global Congress on Process Safety, March 13-17, at Chicago, IL
288. Abdulmohsin, R., Naida, A., and Al-Dahhan, M., (2010), Gas dynamics and heat transfer of pebble bed reactor (PBR) for the 4th generation nuclear energy, The Nuclear Engineering day, September 16-17, at Missouri S&T
287. Abdulmohsin, R., Khane, V., O’Bryant, K., Hallier, P. and Al-Dahhan, M., (2010), Solids and gas dynamics of pebble bed reactor (PBR) for the 4th generation nuclear energy” The Graduate Research Showcase, April 12, at Missouri S&T
286. O’Bryant, K., Hallier, P., Abdulmohsin, R., and Al-Dahhan, M., (2010), Gas dynamics of pebble bed reactor (PBR) for the 4th generation nuclear energy, The 6th annual Undergraduate Research Conference, April 7, at Missouri S&T
285. Xingying Lan, Shrekanta Aradhya, Muthanna Al-Dahhan, (2010) CFD evaluation of the dimensionless groups approach for spouted beds scale-up, paper 97g, Session 97 - Fundamentals of Fluidization - II, AIChE-2010 Annual Meeting, November 2010, Salt Lake City, Utah
284. Shrekanta Aradhya, Muthanna Al-Dahhan, (2010) Implementation of new optical probe in spouted bed to assess the dimensional analysis based scale-up methodology, paper 478g, Session 478 - Multiphase Reaction Engineering, AIChE-2010 Annual Meeting Conference, November 7-12, at Salt Lake City, UT
283. Ahmed, Fadha, Shrekanta Aradhya, Muthanna Al-Dahhan, (2010) Feasibility study of flow regime identification in a fluidized bed using gamma ray densitometry technique, paper 384e, Session 384 - Applications of Fluidization, AIChE-2010 Annual Meeting, November 2010, Salt Lake City, Utah
282. Abdulmohsin, R., and Al-Dahhan, M., (2010), Impact of internals on the heat transfer rate and coefficient in a bubble column, paper 478e, Session 478 - Multiphase Reaction Engineering, AIChE-2010 Annual Meeting Conference, November 7-12, at Salt Lake City, UT
281. Abdulmohsin, R., Karwi, A and Al-Dahhan, M., (2010) “Gas dispersion in a very high temperature pebble bed reactor" ANS Winter Meeting and Nuclear Technology Expo, November 7-11, at Las Vegas, NV
280. Xingying Lan, Muthanna Al-Dahhan, (2010) CFD evaluation for dimensionless groups approach for spouted beds scale-up, Session on Experimental and CFD analysis of Gen-IV reactors, ANS Winter Meeting and Nuclear Technology Expo, November 7-11, 2010 at Las Vegas, NV
279. Vaibhav Khane, G.E. Mueller, and M.H. Al-Dahhan, (2010) Experts in Discrete Element Modeling (EDEM) Validation for Packed Bed Structural Properties, paper 676c, Session 676 - Advances in Numerical Simulations Bridging Chemical and Nuclear Engineering Phenomena or Processes, AIChE-2010 Annual Meeting, November 2010, Salt Lake City, Utah
278. Vaibhav Khane, Rahman Abdul Mohsen, M.H. Al-Dahhan, (2010) Study of Solids Dynamics in PBR using Radioactive Particle Tracking Technique, American Nuclear Society (ANS) Winter Meeting November 2010, Las Vegas, Nevada
277. Nedeltchev, S.; Fadha Ahmed; Muthanna Al-Dahhan, (2010) Identification of main transition velocities in an air-polyethylene fluidized bed based on chaos analysis of computed tomographic scans, paper 478f, session 478 - Multiphase Reaction Engineering, AIChE-2010 Annual Meeting, November 2010, Salt Lake City, Utah
276. Nedeltchev, S.; Shaikh, A., and Al-Dahhan, M. H. (2010), Flow regime transition in bubble columns using Nuclear Gauge Densitometry: Application of non-linear chaos analysis to photon counts history. International Symposium on Chemical Reaction Engineering (ISCRE 21), Philadelphia, PA, USA
275. Mohamed Ezat Hamad and Muthanna Al-Dahhan (2009), Mass transfer in bubble columns with internals, Gas-Liquid and Gas-Liquid-Solid Reactor Engineering Session (GLS 9), 8th World Congress of Chemical Engineering, Montreal, Canada

274. Shaikh A. and Al-Dahhan, M. H. (2009), A New Methodology for Hydrodynamic Similarity in Bubble Column Reactors. Gas-Liquid and Gas-Liquid-Solid Reactor Engineering Session (GLS 9), 8th World Congress of Chemical Engineering, Montreal, Canada
273. Nedeltchev, S.; Shaikh A. and Al-Dahhan, M. H. (2009), Application of Chaos Theory to CT Data: Identification of Transition Velocities in Bubble Columns. Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS 9), 8th World Congress of Chemical Engineering, Montreal, Canada
272. Shaikh A. and Al-Dahhan, M. H. (2009), Online Flow Regime Monitoring in Bubble Column Reactors via Nuclear Gauge Densitometry. Gas-Liquid and Gas-Liquid-Solid Reactor Engineering Session (GLS 9), 8th World Congress of Chemical Engineering, Montreal, Canada
271. Youssef, A., Dudukovic, M. P., Al-Dahhan, M. H. (2009), Novel scale-up methodology for bubble column reactors, GLS 9 (part of the 8th World Congress of Chemical Engineering) Montreal, Canada, August 23-28
270. Youssef, A., Dudukovic, M., Al-Dahhan, M. (2009), On the hydrodynamics of bubble columns with internals for liquid fuels syntheses, AIChE Spring National Meeting, Tampa, Florida, April 26-30, 2009.
269. A. Abdulmohsin, Muthanna Al-Dahhan, M. Morali, (2009) Solids dynamics of high temperature pebble bed nuclear reactors, Energy Summit, University of Missouri System, April, 22-23, Columbia, Missouri
268. Shrekanta Aradhya, Muthanna Al-Dahhan, V. Harvan, (2009) Solids flow dynamics of spouted beds for production of nuclear fuel particles for pebble bed reactors, Energy Summit, University of Missouri System, April, 22-23, Columbia, Missouri
267. M. Ezat Hamed Awad, Muthanna Al-Dahhan, (2009) Mixing characteristic on bubble columns for BTL (biomass to liquid fuels), Energy Summit, University of Missouri System, April, 22-23, Columbia, Missouri
266. A. Youssef, M.P. Dudukovic, Muthanna Al-Dahhan (2009), A new design and scale methodology for bubble columns for BTL, Energy Summit, University of Missouri System, April, 22-23, Columbia, Missouri
265. Mohamed Hamed Ezat Awad, Muthanna Al-Dahhan, (2009) Mixing characteristics of bubble columns with internals for biomass to liquid fuels and chemicals synthesis, Bio-Energy II: Fuels and chemicals from renewable resources, March 9-13, Rio de Janeiro, Brazil
264. Ahmed Youssef, Muthanna Al-Dahhan, M.P. Dudukovic, (2009) Novel design of multiphase reactors for biomass-to-liquid (BTL) conversion, Bio-Energy II: Fuels and chemicals from renewable resources, March 9-13, Rio de Janeiro, Brazil
263. Rajneesh Varma, Muthanna Al-Dahhan, (2009) Optimization of biogas production for maximum energy output from anaerobic digestions, Bio-Energy II: Fuels and chemicals from renewable resources, March 9-13, Rio de Janeiro, Brazil
262. Hu-Ping Luo, Muthanna Al-Dahhan, (2009) Bioenergy production from microalgae culturing, Bio-Energy II: Fuels and chemicals from renewable resources, March 9-13, Rio de Janeiro, Brazil
261. Haase, S., Bauer, T., Al-Dahhan, M., Lange, R., (2008), Untersuchung zu kugelgepackten Monolithreaktoren als Beitrag zur Prozessintensivierung, Jahrestreffen Reaktionstechnik 2008, Würzburg
260. Sean G. Mueller, Muthanna H. Al-Dahhan, Milorad P. Dudukovic, (2008) “In-Situ, Fiber-Optic Measurement Techniques in Carbon Dioxide Expanded Liquid (CXL) Multiphase Reactors”, Presentation at the 2008 AIChE Conference, New Orleans, Division 20, Session 172
259. Ahmed Youssef, Muthanna Al-Dahhan, M.P. Dudukovic, (2008) Novel reactor design for clean alternative fuels synthesis, Energy and Environment Summit, McDonnell International Scholar Academy, Hong Kong, December 8-10
258. Sara Torkumani, Vesna Havran, Muthanna Al-Dahhan (2008) CFD of gas-solid spouted beds for nuclear fuel particles production for the next generation nuclear energy, US-India energy and sustainability symposium, Chandigarh, India, December 28-30
257. Vesna Havran, Derek Starkey, Josh Grims Sean Mueller, Fadha Ahmed, Muthanna Al-Dahhan (2008) Hydrodynamics of the TRISO Nuclear fuel spouted bed coaters using optical probe and Gamma Ray Computed Tomography, International Symposium on Spouted Beds, ISSB – 2008, July 21-23, Beijing, China

256. Bia Henriques, Fan Mei, Khursheed Karim, Steve Picker, Muthanna Al-Dahhan, (2008) A Bioenergy-Based Bench-Scale Experiment for Undergraduate Engineering Students, International conference on Yeast, ICY – 2008, August 11-15, Kiev, Ukraine
255. Rajneesh Varma and Muthanna Al-Dahhan, (2008) A novel dual source Computed Tomography Technique For Measuring Phases Holdup Distribution In Multiphase Systems, 7th International Topical Meeting on Industrial Radiation and Radioisotope Measurement Application, IRRMA 7, 22-27 June, Prague, Czech Republic
254. Ashfaq Shaikh, Muthanna Al-Dahhan, (2008) Novel flow regime determination methods in bubble columns operated for clean alternative energy using gamma ray based techniques, IRRMA7, June 22-27, Prague, Czech Republic
253. Muthanna Al-Dahhan, Huping Luo, Culturing Microalgae in closed Photo bioreactors, (2008) Cell Culture Engineering, Engineering Conference International, April 14-18, Brisbane, Australia
252. Vesna Havran, Derek Starkey, Josh Grims, Sean Mueller, Fadha Ahmed, Muthanna Al-Dahhan, (2008) Investigations of solids and gas holdups of pouted beds using optical probes, XVIII International Conference on Chemical Reactors, September 29 to October 3, Malta.
251. Vaishali S., Shantanu Roy, Satish Bhusarapu, M. H. Al-Dahhan, M. P. Dudukovic, (2007) Numerical simulation of gas-solid dynamics in a circulating fluidized bed riser with Geldart group B particles, Camure-6 and ISMR-5 conference. 14-17 January, Pune, India
250. Lu Han, Muthanna Al-Dahhan, (2007), Solids axial dispersion and distribution in a slurry bubble column reactor, 2nd North America Symposium on Chemical Reaction Engineering, February, Houston
249. Tobias Bauer, Stefan Haase, Muthanna Al-Dahhan, Ruediger Lange, (2007) Monolithic reactor and particle-packed monolithic reactor for three-phase catalytic reactions", AIChE Annual Meeting, Salt Lake City, Utah, Nov. 4-9, Session – Structure Catalytic Reactors: Monoliths and Membranes, 539d
248. Muthanna Al-Dahhan, (2007) Summer Research for High School Students, AIChE Annual Meeting, Salt Lake City, Utah, Nov. 4-9, Session: Chemical Engineering Recruitment and Retention: K-13, 462e
247. Rajneesh Varma, Mehul Vesvikar, Muthanna Al-Dahhan, (2007) Effect of mixing on the performance of a pilot scale anaerobic biodigester, AIChE Annual Meeting, Salt Lake City, Utah, Nov. 4-9, Session: Biotechnology and Bioengineering: Mixing Problems and Solutions, 71e
246. Zeljko Kuzeljevic, Werner Vander Merwe, Milorad P. Dudukovic, Muthanna Al-Dahhan, (2007) Hysteresis in high pressure trickle bed reaction, AIChE Annual Meeting, Salt Lake City, Utah, Nov. 4-9, 2007, Session: Multiphase Reaction Engineering, 38b
245. Rajneesh Varma, Joseph A. O'Sullivan, Muthanna Al-Dahhan, (2007) Dual source computed tomography for measuring phase holdup distribution in multiphase systems", AIChE Annual Meeting, Salt Lake City, Utah, Nov. 4-9, Session: Novel Computational and Experimental Methods in Multiphase Mixing, 601b
244. R. Varma, J.A. O'Sullivan, M.H. Al-Dahhan, (2007) Application of alternating minimization (CAM) in dual source gamma ray computer tomography for imaging three phase systems, 5th World Congress on Industrial Process Tomography, September 3-6, Bergen, Norway
243. A. Shaikh, M.H. Al-Dahhan, (2007) On-line flow regime monitoring in bubble columns via nuclear gauge densitometry, 5th World Congress on Industrial Process Tomography, September 3-6, Bergen, Norway
242. Henriques, A., Johnston, D., and Al-Dahhan, M., (2007) Enzymatic water removal from distiller's grains. Abst. 233rd American Chemical Society Annual Conference. ACS: Chicago, IL
241. Henriques, A., Johnston, D., and Al-Dahhan, M., (2007) Enzymatic water removal from distiller's grains. Poster. 2007 Annual Fuel Ethanol Workshop. FEW: St. Louis, MO
240. Ashfaq Shaikh, Muthanna Al-Dahhan, (2007) Online flow regime monitoring in bubble columns via nuclear gauge densitometry, GLS 8, December 16-19, New Delhi, India.
239. Chengtian Wu, Muthanna Al-Dahhan, (2007) Heat transfer coefficient in high pressure slurry bubble column, GLS 8, December 16-19, New Delhi India
238. Henriques A., Rajneesh Varma, M. Vesvikar, K. Karim, R. Hoffman, Huping Luo, A. Shaikh, Lu Han, Chengtian Wu, Muthanna Al-Dahhan, (2007) Bioenergy from Biomass, Washington University Energy and Environment Symposium, May 5

237. Bauer, T. Haase, S., Al-Dahhan, M., Lange, R., (2007) Hydrodynamics and performance studies in a minichannel and monolith reactor with & without particles. 8th International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS 8), December 16-19, New Delhi, India
236. Chengtian Wu and M. H. Al-Dahhan, (2007) Characterizing Bubble dynamics in a slurry bubble column using an advanced measurement technique. Industrial Symposium on Advances in Hydroprocessing of Oil Fractions (ISAHOF), Michoacan, Mexico, June 26-29
235. S. Nedeltchev, A. Shaikh, and Muthanna Al-Dahhan, (2006), Identification of flow regime transition in a bubble column based on chaos analysis of gamma-ray computed tomography data, 7th German-Japanese Symposium on Bubble Columns, Goslar (Germany), May 20-23, 2006
234. Shaikh A.; Han, L.; Rados, N.; and Al-Dahhan, M. H., (2006) Hydrodynamics of slurry bubble column reactors. Presented at APCChE06-11th Asian pacific confederation of chemical engineering, Kuala Lumpur, Malaysia, August
233. Varma R., Al-Dahhan M.H., (2006) Dual Source Gamma Ray Computer Tomography for Imaging Three Phase Systems. 15th September 2006. AIChE San Francisco, CA, Nov. 16
232. Lu Han; Muthanna Al-Dahhan, (2006) A new methodology to measure the solids dispersion in high pressure slurry bubble column reactor. Oral presentation (294f), AIChE annual meeting, San Francisco, CA, Nov. 16
231. Mehul, Vesvikar, Muthanna Al-Dahhan, (2006) Hydrodynamics and performance of laboratory and pilot plant scale anaerobic digesters, Presented at APCChE06-11th Asian pacific confederation of chemical engineering, Kuala Lumpur, Malaysia, August
230. Bauer, T., Schubert, M., Al-Dahhan, M., Henning, T., Brandner J.J., Lange, R., (2006), Visualization and Characterization of Gas-Liquid Two-Phase Flow in Minichannels. 19th International Symposium on Chemical Reaction Engineering (ISCRE19), Potsdam, Germany
229. Schubert, M., Bauer, T., Al-Dahhan, M Lange, R., (2006) Experimental Comparison of Trickle Bed Reactor and Monolith Reactor at High Pressure, 19th International Symposium on Chemical Reaction Engineering (ISCRE19), Potsdam, Germany
228. Lu Han, Muthanna Al-Dahhan, (2006), A new methodology to determine true tracer response in bubble and slurry bubble column using radioactive particle tracking data, 19th International Symposium on Chemical Reaction Engineering (ISCRE19), Potsdam, Germany
227. Chengtian Wu and Muthanna H. Al-Dahhan, (2006) Bubble Dynamics Study in a Slurry Bubble Column with a Four-Point Optical Probe. AIChE meeting, San Francisco, CA, Nov. 16
226. Subramanya Nayak, Kening Gong, Bala Subramaniam, Al-Dahhan Muthanna, M. P. Dudukovic, (2006) Estimation of Transport and Equilibrium Parameters on Beta-Zeolites- Tracer Experiments on Packed Bed Reactor Systems, AIChE meeting, San Francisco, CA, Nov. 16.
225. Guo J., David K., Al-Dahhan M., (2006) A Client-Server Architecture for Distributed Control and Measurement systems, 9th International Conference on Engineering Education, T1E-18-29, San Juan, PR.
224. M. Al-Dahhan, C. Carpenter, N. Nissing, (2006) Integrating Practice into Engineering Education-The Role of Adjunct Faculty and Industrial Mentor Program, T130-34, 9th International Conference on Engineering Education, T1E-18-29, San Juan, PR
223. Mehul Vesvikar, Muthanna Al-Dahhan, (2006) Effect of Mixing and scale on the performance and hydrodynamics of anaerobic digesters, Bioenergy I, Tomar, Portugal, March 5-10
222. Rajneesh Varma, Muthanna Al-Dahhan, (2006) Effect of Sparger on the hydrodynamics of anaerobic digester mixed by gas recirculation using advanced measurement technique, Bioenergy I, Tomar, Portugal, March 5-10
221. Bhusarapu S., Cassanello M., Al-Dahhan M., Dudukovic M.P., Trujillo S., O'Hern T.J., (2006) Solids dynamics in gas-solid risers inferred from CARPT experiments, 5th World Congress on Particle Technology, Orlando
220. Hoffmann R., Vesvikar M., Varma R., Karim K., Al-Dahhan M., Angenant L., (2005) Effect of shear on performance and microbial community in anaerobic digesters treating cow manure, Animal and Agriculture processing: Managing Environmental Impacts Conference, St. Louis, MO, August 31-September 2, Air and Waste Management Association and Water Environment Federation

219 Jing Guo and Muthanna Al-Dahhan, (2005) “Catalytic wet oxidation over pillared clay catalyst in packed bed reactors: Experimentation and modeling”, CHEMCON-2005, 58th Annual Congress of Indian Chemical Engineering, IIT- New Delhi, December 14-17

218. M. Rafique, M.H. Al-Dahhan, M.P. Dudukovic, (2005) “Effect of different interfacial closures on the dynamics of bubble-column flows, IBCAST2005, Pakistan

217. Mehul Vesvikar and Muthanna Al-Dahhan, (2005) “Effect of mixing on the performance of a pilot-scale anaerobic digester”, Mid-America Environmental Engineering Conference, September 23-24

216. Lu Han and Muthanna Al-Dahhan, (2005) “Axial dispersion of gas phase in slurry bubble column reactor”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005. Session: Solid-Liquid, Liquid-Liquid and Gas Mixing

215. Mehul Vesvikar, Abhijeet Borole, Thomas Klasson, Khursheed Karim, Muthanna Al-Dahhan, David DePaoli, (2005) “Performance of a pilot scale digester and comparison with laboratory scale units”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, Session: Chemicals From Waste Biomass

214. Shaibal Roy and Muthanna Al-Dahhan, (2005) “Effects of flow maldistribution on multiphase monolith reactor performance”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005. Session: Structural Catalytic Reactors: Monoliths and Membranes

213. M.P. Dudukovic and M.H. Al-Dahhan, (2005) “Why scale-up still matters”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005, Session: Rapid Process Scale-Up Through Unique Partnerships

212. Ashfaq Shaikh and M.H. Al-Dahhan, (2005) “A new methodology for scale-up of bubble column reactors”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005, Session: Mixing Issues in Industrial Process I

211. Chengtian Wu, M.H. Al-Dahhan, Anand Prakash, (2005) “Heat transfer coefficient measurements in high pressure bubble column”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005. Session: Multiphase Reaction Engineering

210. Rajneesh Varma and Muthanna Al-Dahhan, (2005) “Hydrodynamic study of gas circulation aerobic bioreactors using particle tracking and gamma ray tomography” 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005, Session: Upstream Bioprocessing

209. Nayak Subramanya, Vidya Sagar Sarsan, Muthanna Al-Dahhan, Bala Subramaniam, Milorad Dudukovic, (2005) “Breakthrough curves for solid-acid catalyzed liquid-phase alkylation reactions”, 2005 AIChE Annual Meeting, October 30 – November 4, Cincinnati, OH, 2005, Session: Liquid Phase Adsorption

208. Henriques, B., Mei, F., Khursheed, K., Al-Dahhan, M., (2005) A Bioenergy Based Bench-Scale Experiment for Undergraduate Engineering Students. ACS 229th Annual Meeting, Green Chemical Education, San Diego, CA, March 13-18

207. Henriques, B., Mei, F., Khursheed, K., Al-Dahhan, M. (2005) A Bioenergy Based Bench-Scale Experiment for Undergraduate Engineering Students. ASEE Annual Conference and Exposition, Portland, OR, June 12-15

206. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković, (2005) Flow Visualization of Gas-Solid Riser Circulating Fluidized Beds, 2005 AIChE Spring Meeting, Atlanta, Georgia, April 10-15

205. Bhusarapu, S., M. H. Al-Dahhan and M. P. Duduković, (2005) Solids Flow Mapping in a Gas-Solid Riser: Mean Holdup and Velocity Fields, 7th World Congress of Chemical Engineering (WCCE7), Glasgow, United Kingdom, July 10-14

204. Bauer, T., Guettel, R., Roy, S., Schubert, M., Al-Dahhan, M, Lange, R., (2005) Modelling and Simulation of the Monolithic Reactor for Gas-Liquid-Solid Reactions. 7th World Congress of Chemical Engineering (WCCE7), Glasgow, United Kingdom, July 10-14

203. Xue J., M. H. Al-Dahhan, M. P. Dudukovic, R. Mudde, (2005), Bubble dynamics in bubble columns, 7th World Congress of Chemical Engineering (WCCE7), Glasgow, United Kingdom, July 10-14

202. S. Bhusarapu, M.H. Al-Dahhan, M.P. Duduković, (2005), An Alternating Minimization Algorithm for Image Reconstruction in Computed Tomography, the 4th World Congress on Industrial Process Tomography, Aizu, Japan, September 5-8

201. Shaikh, A. and Al-Dahhan, M. H. (2005), Identification of Flow Regime in Bubble Columns using Computed Tomography, accepted for Oral Presentation, 4th World Congress on Industrial Process Tomography, Aizu, Japan, September 5-8
200. S. Roy and M.H. Al-Dahhan (2005), Flow Distribution in Monolith using Computed Tomography, the 4th World Congress on Industrial Tomography, Aizu, Japan, September 5-8
199. S. Roy and M.H. Al-Dahhan (2005), Flow Distribution in Monolith using Computed Tomography, the 2nd International Conference on Structured Catalysts and Reactors, Delft, the Netherlands, Oct. 16-19
198. S. Roy and M.H. Al-Dahhan (2005), Effect of Flow Maldistribution on Multiphase Monolith Reactor Performance, the 2nd International Conference on Structured Catalysts and Reactors, Delft, the Netherlands, Oct. 16-19
197. M. H. Al-Dahhan, A. Kemoun, S. Roy, and A. R. Cartolano, R. Dobson, J. Williams, (2005) Study of gas-liquid distribution in a pilot plant monolith reactor using industrial tomography scanner (ITS) , 4th World Congress on Industrial Process Tomography , Aizu, Japan, September 5-8.
196. Lu Han, Muthanna Al-Dahhan, (2005) Volumetric Mass Transfer Coefficient in Bubble Column Reactors. 5th International Symposium on Multiphase Flow, Heat, Mass Transfer and Energy Conversion, Xi'an, China, 3-8 July
195. Novica Rados, Ashfaq Shaikh, and Muthanna Al-Dahhan, (2005), Flow Visualization in High Pressure Slurry Bubble Columns via CARPT and CT. 5th International Symposium on Multiphase Flow, Heat Mass Transfer and Energy Conversion, Xi'an, China, 3-8 July
194. Chengtian Wu, Muthanna Al-Dahhan, (2005), Heat Transfer Coefficient Measurement in Bubble Column, 5th International Symposium on Multiphase Flow, Heat Mass Transfer and Energy Conversion, Xi'an, China, 3-8 July
193. N. Rados, A. Shaikh, M. H. Al-Dahhan (2005), Solids Flow Mapping in a High Pressure Slurry Bubble Columns, GLS 7 conference Strasbourg, France, August 21-25.
192. C. Boyer, A. Koudil, J. Guo, P. Chen, M. H. Al-Dahhan, M. P. Dudukovic', (2005). Study of liquid spreading from a point source in a Trickle Bed via gamma ray Tomography and CFD simulation, GLS7 conference Strasbourg, France, August 21-25
191. Shaikh, A. and Al-Dahhan, M. H. (2005), Characterization of Hydrodynamic Flow Regime in Bubble Columns via Computed Tomography, GLS 7 conference Strasbourg, France, August 21-25.
190. S. Roy and M. H. Al-Dahhan, (2005), Effect of flow maldistribution on multiphase monolith reactor performance, GLS 7 conference Strasbourg, France, August 21-25
189. Bauer, T., Schubert, M., Al-Dahhan, M., Lange, R., (2005), Hydrodynamics of the capillary microreactor. GLS 7 conference Strasbourg, France, August 21-25
188. R. Hoffman, K. Karim, M. Vesvikar, M. H. Al-Dahhan, (2005), Effect of shear on performance and microbial community in anaerobic digesters treating cow manure. 5th International Chemical Engineering Conference, Amman, Jordan, September 12-14
187. Jing Guo and M. H. Al-Dahhan, (2005), Catalytic wet oxidation over pillared clay catalyst in packed-bed reactors: experiments and modeling. 5th International Chemical Engineering Conference, Amman, Jordan, September 12-14.
186. Hu-Ping Luo and Muthanna H. Al-Dahhan (2005), A Novel Modeling Approach for Process Intensification of the Dynamic Growth of Microalgae in Multiphase Photo bioreactors, 5th International Chemical Engineering Conference, Amman, Jordan, September 12-14
185. Bauer, T., Schubert, M., Al-Dahhan, M., Lange, R., (2005), Performance evaluation of monolithic reactors for gas-liquid-solid reactions. 4h Asia-Pacific Conference on Chemical Reaction Engineering Symposium, Gyeongju, Korea
184. Bauer, T., Guettel, R., Roy, S., Al-Dahhan, M, Lange, R., (2005), Modeling of Monolithic Reactors for Catalyzed Gas-Liquid Reactions. 5th International Symposium on Catalysis in Multiphase Reactors (CAMURE-5) and 4th International Symposium on multifunctional Reactors, Portorose, Slovenia, June 15-18
183. S. Bhusarapu, M. H. Al-Dahhan, M. P. Dudukovic', S. Trujillo, T. J. O'Hern, (2005), Experimental study of solids velocity field in gas-solid risers, 5th International Symposium on Catalysis in Multiphase Reactors (CAMURE-5) and 4th International Symposium on multifunctional Reactors (ISMR-5), Portorose, Slovenia, June 15-18

182. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde (2005), Bubble velocity, size, and interfacial area measurements in bubble columns using four-point optical probe, 5th International Symposium on Catalysis in Multiphase Reactors (CAMURE-5) and 4th International Symposium on multifunctional Reactors, Portorose, Slovenia, June 15-18
181. S. Roy and M. H. Al-Dahhan, (2005), Effect of flow distribution on the performance of gas-liquid monolith reactor, 5th International Symposium on Catalysis in Multiphase Reactors (CAMURE-5) and 4th International Symposium on multifunctional Reactors, Portorose, Slovenia, June 15-18
180. Bauer, T., Schubert, M., Al-Dahhan, M., Lange, R., (2005) Hydrodynamics of single monolith channels. 2nd International Conference on Structured Catalysts and Reactors, Delft, Netherlands, October 16-19
179. Shaikh, A.; Al-Dahhan, M. H. (2004), Characterization of Hydrodynamic Flow Regime in Bubble Columns via Computed Tomography, AIChE Annual Meeting, Austin, USA, November 7-12
178. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković (2004), Solids Flow Mapping in a Gas-Solid Riser, AIChE Annual Meeting, Austin USA, November 7-12
177. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković (2004), Quantification of Solids Flow in a Gas-Solid Riser: Single Radioactive Particle Tracking, Oral Presentation, ISCRE 18, Chicago, USA, June 7-9
176. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković, (2004), Flow Visualization of Pilot-Plant Cold Flow FCC Unit via Advanced Non-Invasive Measurement Techniques, Oral Presentation, ISAHOF, Oaxaca, Mexico, April 18-22
175. E. Palmasan, P.A. Ramachandran, K. Balakrishnan, M.H. Al-Dahhan, (2004) "Computation of effectiveness factors for partially wetted complex catalyst shapes using the method of fundamental solutions", ISAHOF 2004, Oaxacan, Mexico, April 18-22
174. Rebecca Hoffmann, Khursheed Karim, Muthanna Al-Dahhan, Lars Angenent, (2004), Effect of Shear on Performance and Microbial Ecology in Anaerobic Digesters Treating Cow Manure. 9th Annual Mid-America Environmental Engineering Conference (MAEEC), Sept. 18, SIU-Edwardsville ($100 cash prize given by the district 8 branch of the American Public Works Association)
173. Vesvikar, M.S., Varma, R., Karim, K., Al-Dahhan, M.H. (2004) "Flow Pattern Visualization in a Mimic Anaerobic Digester: Experimental and Computational Studies." The 10th World Congress - Anaerobic Digestion 2004, Anaerobic Bioconversion for Sustainability, August 29th - September 2nd, Montreal, Canada
172. S. P. Antal, R. L. Lahey, M. H. Al-Dahhan, (2004), Modeling churn-turbulent flows in a slurry/bubble column with a three field model of two-phase flow, 5th International Conference on Multiphase Flow (ICMF-2004), Yokohama, Japan, May 30-June 4
171. Roy S.; Al-Dahhan, MH, (2004), Flow distribution in monolith using computed tomography, AIChE annual meeting, Austin, US, in honor of Mike Dudukovic', Oral Presentation, AIChE Annual Meeting, Austin, USA, November 7-12.
170. Bauer, T., Roy, S., Al-Dahhan, M., Lange, R., (2004), Holdups and Pressure Drop in Multiphase Monolithic Reactors. 18th International Symposium on Chemical Reaction Engineering (ISCRE 18), Chicago, USA, June 7-9
169. Bauer, T., Roy, S., Schubert, M., Al-Dahhan, M., Lange, R., (2004), Investigation of Gas-Liquid Distribution in a Monolithic Reactor using Computed Tomography (CT). 16th International Congress of Chemical and Process Engineering (CHISA-16), Prague, Czech, August 22-26
168. Bauer, T., Roy, S., Schubert, M., Al-Dahhan, M., Lange, R., (2004), Untersuchung zur Gas-Flüssig Verteilung in Monolithreaktoren mittels Computertomographie, GVC-Jahrestagung, Karlsruhe, 2004
167. Guo, J. and Al-Dahhan, M. H. (2004), Liquid holdup and pressure drop in the gas-liquid co-current down flow packed-bed reactor under elevated pressures, ISCRE 18, Chicago, IL, USA, June 7-9
166. Roy, S., Al-Dahhan, M. H., Dudukovic M. P., Skourlis, T., and Dautzenberg F., (2004). Flow distribution in countercurrent flow structured packing bed via Computed Tomography (CT), ISAHOF, Oaxaca, Mexico, 18-22 April

165. Hu-Ping Luo and Muthanna H. Al-Dahhan (2004), Local characteristics of hydrodynamics of in an internal loop airlift photo bioreactor-experimental and theoretical analysis, Oral Presentation, AIChE Annual Meeting, Austin, USA, November 7-12
164 Guo, Jing, Al-Dahhan, M. H. (2004), Catalytic wet air oxidation of phenol on concurrent down flow and upflow packed bed reactors. Oral Presentation, AIChE Annual Meeting, Austin, USA, November 7-12
163. Luo, H.-P. and Al-Dahhan, M.H., (2004), A Novel Modeling Approach for Predictions of the Dynamic Growth of Microalgae in Multiphase Photo bioreactors, 12th International Biotechnology Symposium and Exhibition, Santiago, Chile, October 17-22
162. Karim, K. and Muthanna Al-Dahhan, (2004), Evaluation of upflow anaerobic solids removal (UASR) digester for animal waste (Dairy Manure) digestion, 12th International Biotechnology Symposium and Exhibition, Santiago, Chile, October 17-22
161. Al-Dahhan, Muthanna, Carpenter, Charles N., Nissing, Nick, (2004), Integrating practice into engineering education- the role of adjunct faculty and industrial mentor program, integrating practice into engineering program, Henry W. Patton Center for Engineering Education and Practice, University of Michigan, Dearborn, Michigan, October 3-5
160. Al-Dahhan, M.H., Luo, H.-P., (2003), Local Characteristics of Flows in Airlift Photo-Bioreactors via CARPT experiments and CFD simulation, Computational Fluid Dynamics in Chemical Reaction Engineering III, Davos, Switzerland, May 25-30
159. Hu-Ping Luo and Muthanna H. Al-Dahhan (2003), Analyzing and Modeling of Photo bioreactors by Combining First Principles of Physiology and Hydrodynamics, 1th International Congress on Bioreactor Technology in Cell-, Tissue Culture and Biomedical Applications, Tampere, Finland July 14 – 18
158. Hu-Ping Luo and Muthanna H. Al-Dahhan (2003), Flow characteristics of photo bioreactors, 1th International Congress on Bioreactor Technology in Cell-, Tissue Culture and Biomedical Applications, Tampere, Finland July 14 – 18
157. M. Rafique, M. H. Al-Dahhan, M. P. Dudukovic', (2003), Influence of different closures on the hydrodynamics of bubble column flows, Computational Fluid Dynamics in Chemical Reaction Engineering III, Davos, Switzerland, May 25-30.
156. N. Dromard, O. Delsart, P. Spicka, M. H. Al-Dahhan, M. P. Dudukovic', D. Vedrine, J. Bousquet, C. Roger, (2003), Liquid distribution in trickle bed reactors: experimental and CFD modeling study. Oral Presentation, 4th Middle East Refining and Petrochemicals Conference and Exhibition, Manama, Bahrain, September 28- October 4.
155. M. H. Al-Dahhan, (2003). Non-invasive measurement techniques: CARPT and CT, lecture in a short course on industrial tomography, 3rd world Congress on Industrial Tomography, Banff, Canada, September 2-5.
154. Shaikh, A.; Rados, N.; Al-Dahhan, M. H.; (2003). Phase Distribution in a High Pressure Slurry Bubble Column via Computed Tomography, Oral Presentation, 4th Middle East Refining and Petrochemicals Conference and Exhibition, Manama, Bahrain, September 28- October 4.
153. Shaikh, A.; Al-Dahhan, M. H.; (2003). Flow Regime Delineation in Bubble Columns via Computed Tomography, Oral Presentation, AIChE Annual Meeting, San Francisco, USA, November 16-21.
152. S. Bhusarapu, Pascal Fongerland, M. H. Al-Dahhan and M. P. Duduković,(2003) Measurement and Modeling of Solids RTD in a Circulating Fluidized Bed (CFB) Riser, Oral Presentation, AIChE Annual Meeting, San Francisco, November 16-21.
151. S. Bhusarapu, M. H. Al-Dahhan and M. P. Duduković (2003) Solids Eulerian Flow Field from Lagrangian Information in a Gas-Solid Riser using Computer Automated Radioactive Particle Tracking, Oral Presentation, AIChE Annual Meeting, San Francisco.
150. Mehul S Vesvikar, Muthanna Al-Dahhan, (2003). Flow Pattern Visualization in a Mimic Anaerobic Digester using CFD, AIChE Annual meeting, San-Francisco, November 16-21
149. Mehul S Vesvikar, Rajneesh Varma, Khursheed Karim, Muthanna Al-Dahhan, (2003) Flow Pattern Visualization in a Mimic Anaerobic Digester: Experimental and Computational Studies, AIChE Annual meeting, San-Francisco, November 16-21.
148. Hu-Ping Luo and Muthanna H. Al-Dahhan (2003). Analyzing and Modeling of Photo bioreactors by Combining First Principles of Physiology and Hydrodynamics, AIChE Annual meeting, San-Francisco, November 16-21

147. K. Karim, R. Hoffman, Thomas Klasson, M. H. Al-Dahhan, (2003) Anaerobic digestion of animal waste: effect of mode of mixing. AIChE Annual meeting, San-Francisco, November 16-21
146. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde (2003) Bubble dynamics measurements in bubble columns using four-point optical probe, AIChE Annual meeting, San-Francisco, November 16-21
145. J. Guo and M. H. Al-Dahhan (2003) Modeling verification and application for catalytic wet oxidation in packed bed reactors, AIChE Annual meeting, San-Francisco, November 16-21
144. Mehul S Vesvikar, Muthanna Al-Dahhan, (2003). Flow Pattern Visualization in a Mimic Anaerobic Digester using CFD, poster presentation, Computational Fluid Dynamics in Chemical Reaction Engineering III, Davos, Switzerland, May 25-30
143. Karim, K., Klasson, K.T., Hoffmann, R., Dresher, S.R., DePaoli, D.W. and Al-Dahhan, M.H. (2003) "Anaerobic digestion of animal waste: Effect of mixing", International Conference on Energy and Environment, Halkidiki, Greece, 14-16 May
142. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde, (2003). Bubble dynamics measurements using four-point optical probe. 6th Gas-liquid and Gas-liquid-solid Symposium (GLS6), Vancouver, British Columbia, Canada, August 17-20
141. M. Vesvikar, R. Varma, S. Bhusarapu, S. Roy, A. Shaikh, H. Luo, M. Al-Dahhan, M. P. Dudukovic', (2003). Flow measurement techniques-CARPT and CT, Washington University, Sesquicentennial Week, November, 10-14.
140. H. Luo and M. H. Al-Dahhan (2003) Microalgae culturing in air-lift bioreactors, Washington University, Sesquicentennial Week, November, 10-14.
139. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde, (2003) Optical probe for bubble dynamics. Washington University, Sesquicentennial Week, November, 10-14
138. K. Karim, R. Verma, M. Vesvikar, R. Hoffman (2003). Performance and hydrodynamic characterization of anaerobic digesters, Washington University, Sesquicentennial Week, November, 10-14
137. Al-Dahhan M.H., Luo H.-P., Kemoun A., Fernandez J.M., Grima E.M. (2002). Analysis of Photo bioreactor for Culturing High Value Products: Microalgae and Cyanobacteria via Advanced Diagnostic Techniques. 17th International Symposium on Chemical Reaction Engineering (ISCRE17), Hong Kong, Aug. 25-28.
136. J. M. Fernandez, J. L. Garcia, F. Garcia, E. Molina, M. H. Al-Dahhan, H. Luo, A. Kemoun, (2002). Integration of fluid dynamics light regime and photosynthetic response in photo bioreactors, 1st Congress on the International Society for Applied Phycology/ 9th International Conference on Applied Algology, Aquaduke, Almeria, Spain, May 26-30
135. H. Luo, A. Kemoun, M. H. Al-Dahhan, J. M. Fernandez, J. L. Garcia, E. Molina, (2002). Advanced measurement techniques for characterizing microalgae photo bioreactors, 1st Congress on the International Society for Applied Phycology/ 9th International Conference on Applied Algology, Aquaduke, Almeria, Spain, May 26-30
134. S. Bhusarapu, M. H. Al-Dahhan, M. P. Dudukovic' (2002). Flow visualization in gas-solid riser. MFDRC, Purdue University, West Lafayette, April, 22-24.
133. S. Bhusarapu, M. H. Al-Dahhan, M. P. Dudukovic' (2002) Residence time distribution of solids in gas-solid riser, MFDRC, Ohio, September 30- October 2
132. Luo, H.-P. and Al-Dahhan, M.H. (2002). Photo bioreactors for Culturing High Value Microalgae and Cyanobacteria: Experimentation and Modeling. AIChE annual meeting, Indianapolis, Indiana, Nov. 3-8.
131. M. H. Al-Dahhan, B. Joseph, C. Carpenter, (2002). Prototype program for a joint academic/industry sponsored design course, International Conference on Engineering Education (ICEE 2002), Manchester, UK, August 18-21.
130. Shaikh, A. and Al-Dahhan, M. H.; (2002). Prediction of Overall Gas Holdup in Bubble Column via Neural Network Correlation, Oral Presentation, AIChE Spring Meeting, New Orleans, USA, March 10-14.
129. Rados, N.; Kemoun, A.; Shaikh, A.; Al-Dahhan, M. H.; Dudukovic, M. P.; (2002). Implementation of Radioactive Particle Tracking and Tomography in Flow Visualization of High Pressure Slurry Bubble Column Reactors, Oral Presentation, 4th Symposium on High Pressure Technology and Chemical Engineering, Venice, Italy, September 22-25.

128. Shaikh, A.; Al-Dahhan, M. H.; (2002). Prediction of Overall Gas Holdup in Bubble Column via Artificial Neural Network Correlation, Oral Presentation, ISCRE 17, Hong Kong, China, August 25-28.
127. S. Bhusarapu, P. Fongarland, M. H. Al-Dahhan and M. P. Duduković (2002) A Non-Invasive Method for Overall Solids Flux Measurements in a Circulating Fluidized Bed (CFB), Poster Presentation, CFB7 Conference, Niagara Falls, Canada, May 5-8.
126. Karim, K., Vesvikar, M., Varma, R., and Al-Dahhan, M.H., (2002). Flow pattern imaging inside a simulated digester using computer automated particle tracking technique (CARPT)," AICHE annual meeting, Indianapolis, Indiana, Nov. 3-8.
125. N. Rados, M. H. Al-Dahhan, M. P. Dudukovic (2002). Modeling of Fisher-Tropsch Synthesis in Slurry Bubble Column Reactors, presented at International Symposium on Catalysis in Multiphase Reactor (CAMURE 4), Laussane, Switzerland, September 22-25.
124. Rammohan, A. R., Kemoun, A., Al-Dahhan, M. H., and Dudukovic M. P. (2002). Gas liquid flows in stirred tank reactors. AIChE Annual Meeting, Indianapolis, Indiana, November 3-8
123. N. Rados, M. H. Al-Dahhan, M. P. Dudukovic (2002). Modeling of Fisher-Tropsch Synthesis in Slurry Bubble Column Reactors, Oral Presentation, ISCRE 17, Hong Kong, China, August 25-28
122. M. Al-Dahhan, (2002). Diagnostic techniques for slurry bubble column reactors. UCR-DOE Review Meeting, Pittsburgh, PA, June 1-5.
121. J. Xue, M. H. Al-Dahhan, M. P. Dudukovic', R. F. Mudde, (2002) Bubble dynamics measurements using four-point optical probe, AIChE Annual Meeting, Indianapolis, Indiana, November 3-8
120 S. Bhusarapu, P. Fongerland, A. Vold, M. H. Al-Dahhan, M. P. Dudukovic, (2002) A non-invasive method for overall solids flux measurement in a circulating fluidized bed (CFB). AIChE Annual Meeting, Indianapolis, Indiana, November 3-8
119. Rammohan, A. Kemoun, M. H. Al-Dahhan, M. P. Dudukovic' (2002), Gas holdup distribution in a stirred tank reactor, AIChE Annual Meeting, Indianapolis, Indiana, November 3-8.
118. J. Guo and M. H. Al-Dahhan (2002) Modeling of catalytic reaction in trickle bed and upflow packed bed reactor. AIChE Annual Meeting, Indianapolis, Indiana, November 3-8
117. J. Guo and M. H. Al-Dahhan (2002) Catalytic wet oxidation of phenol by hydrogen peroxide over pillared clay catalyst. AIChE Annual Meeting, Indianapolis, Indiana, November 3-8
116. P. Spicka, M. H. Al-Dahhan, M. P. Dudukovic, (2002) Effect of sparger nozzle orientation on gas-holdup and liquid recirculation in gas-liquid columns. AIChE Annual Meeting, Indianapolis, Indiana, November 3-8
115. M. H. Al-Dahhan, (2002). Flow visualization of multiphase flow systems, the 6th Saudi Engineering Conference, Thermal Systems, Dhahran, Saudi Arabia, December 14-17.
114. M. H. Al-Dahhan, (2002). Integrated approach of computing and computer applications at an early stage of undergraduate engineering program, the 6th Saudi Engineering Conference, Thermal Systems, Dhahran, Saudi Arabia, December 14-17
113. Shaikh, A., Al-Dahhan, M. H. (2001). Development of Neural Network based Correlation for Overall Gas Holdup in Bubble Column, AIChE Annual Meeting, Reno, NV, USA, November 4-9.
112. Wu, Y., Shaikh, A., Al-Dahhan, M. H. (2001). Prediction of Mass Transfer Coefficient in Bubble Columns at High Pressure Operation, Poster Presentation, AIChE Annual Meeting, Reno, NV, USA, November 4-9
111. Dambal and M. H. Al-Dahhan (2001) Effect of high-pressure operation on relative permeability in trickle bed reactors, AIChE Annual Meeting, Reno, NV, USA, November 4-9
110. M. Rafique, M. H. Al-Dahhan, M. P. Dudukovic' (2001) The merits/demerits of different closures on the dynamics of bubble columns. AIChE Annual Meeting, Reno, NV, USA, November 4-9
109. M. P. Dudukovic, Shantanu Roy and M. H. Al-Dahhan, (2001) 'Flow Mapping and Modeling of Liquid-Solid Risers', Presented at XV International Conference of Chemical Reactors CHEMREACTOR XV, Helsinki, Finland, June 5-8
108. S. Roy, F. Larachi, M. H. Al-Dahhan and M. P. Dudukovic, (2001). "Resolution and Sensitivity in Computer Automated Radioactive Particle Tracking (CARPT)", Advances in Signal Processing for Non-Destructive Evaluation of Materials, IVth International Workshop, Quebec City, Canada, August 7-10.
107. Alvaré, J., Al-Dahhan, M.H., (2001). "Overall Liquid Phase Mixing in Trayed Bubble Columns", AIChE Annual Meeting, Reno, NV, USA, November 4-9

106. Rammohan, A. R., Kemoun, A., Al-Dahhan, M. H., and Dudukovic M. P. (2001). Characterization of single-phase flow in a stirred tank using Computer Automated Radioactive Particle Tracking (CARPT), Fourth International Symposium on Mixing in Industrial Processes, Toulouse, France
105. Y. Jiang, M.R. Khadilkar, M.H. Al-Dahhan, M.P. Dudukovic, (2001), Macroscale multiphase flow modeling using k-fluid model, 4th International conference on multiphase flow, New Orleans, LA, May 27-June 1.
104. Fernandez, J.M., E. Molina Grima, F. Garcia, A. Kemoun, M.H. Al-Dahhan, (2001), Irradiance frequency and cell movement in microalgae photobioreactors, 4th International Asia-Pacific Marine Biotechnology Conference, Hawaii, October 21-24.
103. Kemoun, N. Rados, F. Li, M. H. Al-Dahhan, M. P. Dudukovic, P. L. Mills, T. M. Leib and J. J. Lerou,(2000). Gas Holdup in a Trayed Cold-Flow Bubble Column", ISCRE Meeting, Krakow, Poland.
102. J.M. Fernandez, Muthanna H. Al-Dahhan, A. Kemoun, E. Molina Grima, F. Garcia, (2000) "Cells movement and irradiance frequencies in the microalgae photo bioreactors", 4th European Workshop – Biotechnology of Microalgae, European Society of Microalgae Biotechnology, Potsdan, Germany, May 29-30.
101. Amy, Christina Wiegand, Steve Picker, Muthanna Al-Dahhan, (2000) Production of clean fuel: A biochemical experiment for unit operation lab developed through undergraduate research project, AIChE Regional Conference, Washington University, St. Louis, MO, March 24-26.
100. S. Roy, F. Larachi, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) "Resolution and sensitivity in computer automated radioactive particle tracking (CARPT)", Photonics East Conference, SPIE, Process Imaging for Automatic Control, Session 2, Modeling and Control, Boston, MA, November 5-8.
99. D. Tasamatsoulis, Muthanna H. Al-Dahhan, F. Larachi, N. Papayannakos, (2000) "The particle dilution effect on catalyst wetting efficiency and liquid film thickness in laboratory trickle-bed reactors", 3rd Int. Symp. on Catalysis in Multiphase Reactors, Naples, Italy, May 29-31.
98. Y. Jiang, M.R. Khadilkar, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) "CFD modeling of multiphase flow distribution in catalytic packed-bed reactors: scale down issues", 3rd Int. Symp. on Catalysis in Multiphase Reactors, Naples, Italy, May 29-21.
97. Y. Jiang, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000)"A parallel approach to catalyst and reactor selection for a fine chemical process", 3rd Int. Symp., on Catalysis in Multiphase Reactors, Naples, Italy, May 29-31
96. P. Gupta, B.C. Ong, Muthanna H. Al-Dahhan, M.P. Dudukovic, B.A. Toseland, (2000) "Hydrodynamics of Churn-turbulent bubble columns: gas-liquid recirculation and mechanistic modeling", 16th Canadian Symposium on Catalysis, Banff, Canada, May 23-26.
95. Y. Jiang, M.R. Khadilkar, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) "CFD modeling of fluid flow packed beds", Engineering Foundation – Chemical Reaction Engineering VII: Computational Fluid Dynamics in Chemical Reaction Engineering, Quebec, Canada, August 6-11.
94. Muthanna H. Al-Dahhan, (2000) "Advanced Diagnostics technique for three-phase slurry bubble column reactors (SBCR)", DOE Review Meeting, Pittsburgh, PA, June 6-7.
93. Y. Wu, B.C. Ong, Muthanna H. Al-Dahhan, (2000)Prediction of radial gas holdup profiles in bubble columns reactors", 16th International Symposium on Chemical Reaction Engineering (ISCRE 16), Krakow, Poland, September 10-13.
92. Y. Wu, Muthanna H. Al-Dahhan, (2000) "Prediction of axial liquid velocity profile in bubble columns", ISCRE 16, Krakow, Poland, September 10-13
91. Y. Jiang, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) "Statistical characterization of macroscale multiphase flow textures in trickle beds", 16th International Symposium on Chemical Reaction Engineering (ISCRE 16), Krakow, Poland, September 10-13.
90. P. Gupta, Muthanna H. Al-Dahhan, M.P. Dudukovic, B.A. Toseland, (2000) "Comparison of single and two-bubble class gas-liquid recirculation models – application to pilot plant radioactive tracer studies during methanol synthesis", ISCRE 16, Krakow, Poland, September 10-13.
89. A. Kemoun, N. Rados, Muthanna H. Al-Dahhan, M.P. Dudukovic, P.L. Mills, T.M. Leib, J.J. Lerou, (2000) "Gas holdup in a trayed cold-flow bubble column", ISCRE 16, Krakow, Poland, September 10-13.

88. S. Roy, A. Kemoun, Muthanna H. Al-Dahhan, M.P. Dudukovic, (2000) “Interpretation of solids mixing in liquid-solid risers via CARPT”, AIChE Annual Meeting, Industrial Applications of Multiphase Reactors, Los Angeles, CA, November 12-17.
87. W. Highfill, B.T. Ong, Muthanna H. Al-Dahhan, (2000) “Drawbacks in the measurement of liquid-solid mass transfer coefficient in two-phase flow packed bed reactors operated at low and high pressure”, AIChE Annual Meeting, Kinetics, Catalysis and Reaction Engineering, Los Angeles, CA, November 12-17.
86. Muthanna H. Al-Dahhan, (2000) “Gas-solid riser”, MFDRC Review Meeting, Midland, MI, September 16-17.
85. M.P. Dudukovic, Muthanna H. Al-Dahhan, (2000) “CARPT studies of gas-solid risers”, MFRDC Meeting, Sandia, Albuquerque, NM, April 12-14
84. M.P. Dudukovic, Muthanna H. Al-Dahhan, B.C. Ong, A. Kemoun, N. Rados, (2000) “Distributor effects on gas holdup profiles in bubble columns”, DOE Review Meeting, Sandia National Laboratory, Albuquerque, NM, May 9.
83. M.P. Dudukovic, Muthanna H. Al-Dahhan, B.C. Ong, A. Kemoun, N. Rados, (2000) “Bubble column hydrodynamics”, Air Products Review Meeting, Allentown, PA, May 24.
82. Muthanna H. Al-Dahhan, Steve Picker, Cristina Weigand, Amy Chen, (2000) “Production of clean fuel: a biochemical experiment for unit operations laboratory”, ASEE Annual Conference, Session 2513 (The greening of the ChE Curriculum), St. Louis, MO, June 18-21.
81. Muthanna H. Al-Dahhan, (2000) “Integration of design and selection of process engineering components into unit operation laboratory”, ASEE Annual Conference, Session 2559 (Instrumentation), St. Louis, MO, June 18-21.
80. Muthanna H. Al-Dahhan, (2000) “Incorporation of graduate facilities into undergraduate unit operations laboratory”, ASEE Annual Conference, Session 3413 (ChE Laboratories in the Next Millennium), St. Louis, MO, June 18-21.
79. Muthanna H. Al-Dahhan, A. Kemoun, J.M. Fernandez, E. Molina Grima, F. Garcia, (2000) “Computer automated radioactive particle tracking (CARPT) Applied to microalgae photo bioreactors”, 219th American Chemical Society (ACS) National Meeting – Biochemical Technology division, San Francisco, CA, March 26-30.
78. Muthanna H. Al-Dahhan, A. Kemoun, J.M. Fernandez, J.L. Garcia, F.G. Gamacho, E.G. Molina, (2000) “Characterization of irradiance frequencies in the microalgae photobioreactors via radioactive particle tracking”, AIChE Annual Meeting, Session 358 – Multiphase Reactors in Biochemical Technology, Modeling Experimentation and Applications, Los Angeles, CA, November 12-17.
77. S. Roy, M. P. Dudukovic, M. H. Al-Dahhan and F. Larachi, (1999) "Flow Mapping In a Gas-Solids Riser using Computer Automated Radioactive Particle Tracking (CARPT): A Proposed Study", DOE/OIT-MFDRC Review Meeting, Washington DC, USA, February 10.
76. S. Roy, A. Kemoun, M. H. Al-Dahhan and M. P. Dudukovic, (1999) "Dense, Vertical Liquid-Solid Flow in a Riser: Experimental Analysis", Presented at NHTC '99: The 33rd National Heat Transfer Conference, Albuquerque, NM, USA, August 15-17.
75. S. Roy, A. Kemoun, M. H. Al-Dahhan and M. P. Dudukovic, (1999) "Non-Intrusive Measurement of Solids Dispersion in a Liquid-Solid Riser", AIChE Annual Meeting, Dallas, TX, USA, November.
74. A. Kemoun, N. Rados, B. C. Ong, M. H. Al-Dahhan, and M. P. Dudukovic (1999). Implementation of CARPT in High Pressure Bubble/Slurry Bubble Column”, AIChE Annual Meeting, Dallas, TX, USA.
73. J. Chen., N. Rados, M. H. Al-Dahhan, M. P. Dudukovic, (1999) Particle Motion in Packed/ Ebullated Beds by CT and CARPT, AIChE Annual Meeting, Dallas, TX, USA
72. Alvaré, J., Al-Dahhan, M.H., (1999).“Gas Holdup in Trayed Bubble Columns”, AIChE Annual Meeting, Dallas, TX
71. Rammohan, A. R., Kemoun, A., Al-Dahhan, M. H., and Dudukovic M. P. (1999). Characterization of single-phase flow in a stirred tank using Computer Automated Radioactive Particle Tracking (CARPT) MIXING XVII, 17th North American Mixing Conference, Alberta, Canada
70. Rammohan, A. R., Ranade, V. V., Kemoun, A., Al-Dahhan, M. H., and Dudukovic M. P. (1999). Motion of neutrally buoyant particles in stirred vessels: Computer Automated Radioactive Particle Tracking (CARPT) and CFD simulations, MIXING XVII, 17th North American Mixing Conference, Alberta, Canada

69. Rammohan, A. R., Kemoun, A., Al-Dahhan, M. H., and Dudukovic M. P. (1999). Characterization of single-phase flow in a stirred tank using Computer Automated Radioactive Particle Tracking (CARPT) AIChE Annual Meeting, Dallas, TX
68. S. Roy, M.P. Dudukovic, M.H. Al-Dahhan, F. Larachi, (1999) "Flow mapping in a gas-solid riser using computer automated radioactive particle tracking (CARPT)", DOE/OIT-MFDRC Review Meeting, Washington DC, February 10.
67. Y. Jiang, M. Al-Dahhan, M.P. Dudukovic, (1999) "Advanced multiphase flow modeling in packed-bed reactor", Engineering Center, DuPont Engineering Center, Wilmington, DE, July.
66. S. Roy, A. Kemoun, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Dense, vertical liquid-solid flow in a riser: experimental analysis", The 33rd National Heat Transfer Conference, Albuquerque, NM, August 15-17.
65. A. Kemoun, A. Rammohan, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Characterization of single phase flow in a stirred tank using computer automated radioactive particle tracking (CARPT)", Mixing XVII, 17th Biennial North America Mixing Conference, Banff, Alberta, Canada, August 15-20.
64. V.V. Ranada, A. Rammohan, A. Kemoun, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Motion of neutrally buoyant particles in stirred vessels: CARPT experiments and CFD simulations, Mixing XVII, 17th Biennial North America Mixing Conference, Banff, Alberta, Canada, August 15-20.
63. P. Gupta, B.C. Ong, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Investigation of liquid mixing in churn-turbulent bubble column using conductivity probes", Mixing XVII, 17th Biennial North America Mixing Conference, Banff, Alberta, Canada, August 15-20.
62 S. Roy, R. Dodson, F. Larachi, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Flow mapping in a gas-solid riser via computer automated radioactive particle tracking", Annual Meeting of the Multiphase Fluid Dynamics Research Consortium (MFDRC), Mendenhall, Pennsylvania, September 26-28.
61. J. Chen, N. Rados, M.H. Al-Dahhan, M.P. Dudukovic, D. Nguyen, K. Parimi, (1999) "Study of particle motion in packed/ebullated beds with computed tomography (CT) and computer automated radioactive particle tracking (CARPT)", 49th Canadian Chemical Engineering Conference (CCEC), Saskatoon, Saskatchewan, October 3-6.
60. S. Roy, A. Kemoun, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Non-intrusive measurement of solids dispersion in a liquid-solid riser", Paper 139f, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
59. J. Chen, N. Rados, M.H. Al-Dahhan, M.P. Dudukovic, D. Nguyen, K. Parimi, (1999) "Measuring incipient particle motion in three phase packed/ebullated beds with computed tomography (CT) and computer automated radioactive particle tracking (CARPT)", Paper 140e, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
58. A. Kemoun, R. Rammohan, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Characterization of single phase flow in a stirred tank reactor using computer automated radioactive particle tracking (CARPT)", Paper 166e, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
57. A Kemoun, B.C. Ong, P. Gupta, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Gas-holdup in a high pressure bubble column by computed tomography", Paper 304c, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
56. J. Alvare, M.H. Al-Dahhan, C. Dassori, (1999) "Gas holdup in trayed bubble columns", Paper 306e, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
55. Y. Jiang, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Mixing-cell network model for design of trickle-bed reactors", Paper 306f, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
54. Y. Jiang, M.H. Al-Dahhan, M.P. Dudukovic, (1999) "Statistical characterization of two phase flow in bubble column", Paper 309f, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
53. P. Gupta, M.H. Al-Dahhan, M.P. Dudukovic, P.L. Mills, (1999) "A novel filtering method for determination of liquid-phase tracer responses in bubble columns from conductivity probe measurements", Paper 314j, AIChE Annual Meeting, Dallas, Texas, October 31- November 5.
52. M. R. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, (1998) "Parametric study of unsteady state flow modulation in trickle bed reactors", ISCRE15, Newport Beach, California, September 13-16
51. Y. Jiang, M. R. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, (1998) "Two phase flow distribution in 2d trickle-bed reactors", ISCRE15, Newport Beach, California, September 13-16

50. J. Chen, F. Li, S. Degaleesan, P. Gupta, M. H. Al-Dahhan, M. P. Dudukovic, B. Toseland, (1998) “Fluid dynamic parameters in bubble columns with internals”, ISCRE15, Newport Beach, California, September 13-16.
49. J. Chen, A. Kemoun, M. H. Al-Dahhan, M. P. Dudukovic, D. J. lee, L.-S. Fan (1998) “Comparative hydrodynamics study in a bubble column using computer automated radioactive particle tracking (CARPT) / computed tomography (CT) and particle image velocimetry (PIV)”, ISCRE15, Newport Beach, California, September 13-16.
48. S. Saberi, M.H. Al-Dahhan, M.P. Dudukovic, B. Toseland, (1998) “Parametric analysis of one dimensional modeling of gas-liquid flow in bubble column”, Paper 242k, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
47. M. R. Khadilkar, M.H. Al-Dahhan, M.P. Dudukovic, (1998) “Unsteady state flow modulation in trickle bed reactors: experiments and model predictions”, Paper 318bh, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
46. Y. Jiang, M.H. Al-Dahhan, M.P. Dudukovic, (1998) “Gas flow modeling in packed beds”, Paper 318bi, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
45. W. Highfill, M.H. Al-Dahhan, (1998) “Liquid-solid mass transfer coefficient in high pressure trickle bed reactors”, Paper 318bj, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
44. W. Highfill, M.H. Al-Dahhan, (1998) “Liquid holdup measurement techniques in high pressure laboratory trickle-bed reactors”, Paper 318bk, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
43. J. Chen, F. Li, M.H. Al-Dahhan, M.P. Dudukovic, B. Toseland, (1998) ”liquid turbulence and back-mixing in large diameter bubble columns with internals”, Paper 242i, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
42. Y. Jiang, M.H. Al-Dahhan, M.P. Dudukovic, (1998) “Liquid flow maldistribution and reaction performance in trickle-bed reactors”, Paper 304e, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
41. M.H. Al-Dahhan, M.P. Dudukovic, (1998) “Scale-up in reaction engineering”– invited lecture - Paper 307a, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
40. S. Roy, A. Kemoun, M.H. Al-Dahhan, M.P. Dudukovic, (1998) “Experimental investigation of flow in a liquid-solid riser”, Paper 165g, AIChE Annual Meeting, Miami Beach, Florida, November 15-20.
39. Y. Jiang, J. Mettes, M. Khadilkar, M.H. Al-Dahhan, (1998) “Experimental investigation of liquid flow distribution in trickle-bed reactors under steady state and periodic operation”, paper 181-1b
38. S. Roy, J. Chen, S. Degaleesan, P. Gupta, M.H. Al-Dahhan, M.P. Dudukovic, (1998) “Non-invasive flow monitoring in opaque multiphase reactors via CARPT and CAT”, paper FEDSM98-5077 ASME Fluids Engineering Division Summer Meeting, Washington, DC, USA, June 21-25.
37. Y. Wu, M. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, (1997) “Effect of catalyst wetting on the performance of trickle-bed reactors”, Second Joint U.S./China Chemical Engineering Conference, Beijing, China, May 19-22.
36. M. P. Dudukovic, M. H. Al-Dahhan, M. Khadilkar, Y. Wu, (1997) “Study of trickle-bed reactor performance under periodic operation”, Second Joint U.S./China Chemical Engineering Conference, Beijing, China, May 19-22
35. J. Chen, P. Gupta, M. H. Al-Dahhan, S. B. Kumar, M. P. Dudukovic, (1997) “Gas holdup in bubble columns measured by computer tomography”, Frontiers in Industrial Process Tomography - II, Delft, The Netherlands, April.
34. M. P. Dudukovic, M. H. Al-Dahhan, P. Gupta, Y. Yang, S. Degaleesan, L. S. Fan, P. Jiang, J. Reese, D. L. Lee, R. F. Mudde, M. Chang, (1997) “Novel techniques for slurry bubble column hydrodynamics”, The Annual Review Meeting, University Coal Research Program, Department of Energy, Pittsburgh, Pennsylvania, June 3-4.
33. S. Roy, J. Chen, S. Kumar, M. H. Al-Dahhan, M. P. Dudukovic, (1997) “Flow pattern studies in liquid-solid riser reactor”, Chemical Reactor Engineering for Sustainable Processes and Products, Chemical Reaction Engineering VI, Engineering Foundation Conference, Banff, Canada, June 8-13.
32. M. H. Al-Dahhan, F. Larachi (Laval University), M. P. Dudukovic, (1997) “Recent advances in high pressure trickle-bed reactors”, Chemical Reactor Engineering for Sustainable Processes

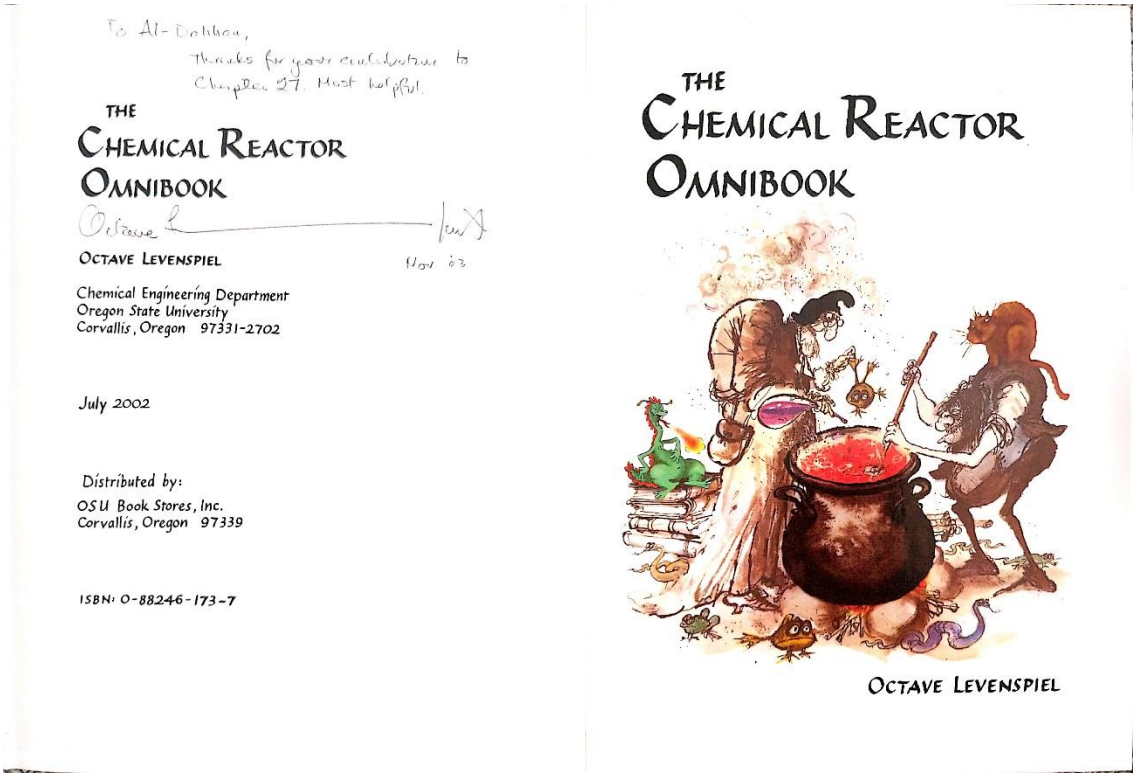
and Products, Chemical Reaction Engineering VI, Engineering Foundation Conference, Banff, Canada, June 8-13.

31. M. R. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic' (1997) Simulation of unsteady state operation in trickle-bed reactors, Chemical Reactor Engineering for Sustainable Processes and Products, Chemical Reaction Engineering VI, Engineering Foundation Conference, Banff, Canada, June 8-13.
30. F. Larachi, M. H. Al-Dahhan, M. P. Dudukovic, (1997) "Trickle-Bed reactors at high pressure: a state-of-the-art review", Paper, 484, Session 48, 47th Canadian Chemical Engineering Conference, October 5-8, Edmonton, Alberta, Canada.
29. M. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, (1997) "Simulation of unsteady state operation in trickle bed reactors", Paper 254e, AIChE Annual Meeting, Los Angeles, California, November 16-21.
28. M. Khadilkar, Y. Jiang, M. H. Al-Dahhan, M. P. Dudukovic, (1997) "Investigation of a complex reaction network in a high pressure trickle bed reactor", Paper 252a, AIChE Annual Meeting, Los Angeles, California, November 16-21.
27. Y. Jiang, M. Khadilkar, M. H. Al-Dahhan, M. P. Dudukovic, (1997) "Prediction of two phase flow distribution in 2D trickle bed reactors", Paper 276a, AIChE Annual Meeting, Los Angeles, California, November 16-21.
26. J. Chen, S. Degaleesan, M. H. Al-Dahhan, M. P. Dudukovic, B. Toseland, (1997) "Tracer data analysis with axial dispersion model for two pilot plant slurry reactors", Paper 150d, AIChE Annual Meeting, Los Angeles, California, November 16-21.
25. J. Chen, P. Gupta, F. Li, S. Degaleesan, S. Roy, M. H. Al-Dahhan, M. P. Dudukovic, B. Toseland, (1997) "Column scale effects on gas holdup and flow pattern in bubble columns", Paper 217d, AIChE Annual Meeting, Los Angeles, California, November 16-21.
24. M. Khadilkar, Y. Wu, M. Al-Dahhan, M.P. Dudukovic, (1996) "Comparison of trickle-bed and upflow reactor performance at high pressure: model predictions and experimental observations", ISCRE 14, Belgium, 5-8 May.
23. Y. Wu, M. Khadilkar, M. Al-Dahhan, M.P. Dudukovic, (1996) "Evaluation of a trickle bed reactor model using liquid limited chemical reaction", ISCRE 14, Belgium, 5-8 May
22. M. H. Al-Dahhan, Y. Wu, M. Khadilkar, M. P. Dudukovic, (1996) "Improved prediction of pressure drop and liquid holdup in high pressure trickle-bed reactors", Paper 3L, 5th World Congress of Chemical Engineering, San Diego, July 14-18.
21. F. Larachi, M. H. Al-Dahhan, M. P. Dudukovic, A. Laurent, (1996) "High pressure trickle-bed reactors: a state-of-the-art review", 12th International Congress of Chemical & Process Engineering, CHISA'96, August.
20. P. Gupta, M. Al-Dahhan, M. P. Dudukovic, (1996) "1-D phenomenological model for churn-turbulent bubble columns based on experiments", Computational Fluid Dynamics (CFD) in Chemical Reaction Engineering Conference, Engineering Foundation Conference, San Diego, October, 13-18.
19. S. Roy, J. Chen, S. Kumar, M. Al-Dahhan, M. P. Dudukovic, (1996) "Experimental results in the flow in liquid-solid risers" Computational Fluid Dynamics (CFD) in Chemical Reaction Engineering Conference, Engineering Foundation Conference, San Diego, October, 13-18.
18. R. Heck, M. H. Al-Dahhan, M. P. Dudukovic, (1996) "Scale-Up, design and performance of trickle-bed reactors", paper 163b, AIChE Annual Meeting, Chicago, Illinois, November 10-15.
17. S. Roy, J. Chen, S. Kumar, M. Al-Dahhan, M. P. Dudukovic, (1996) "Liquid phase mixing in liquid-solid circulating reactor", Paper 107d, AIChE Annual Meeting, Chicago, Illinois, November 10-15.
16. S. Roy, J. Chen, S. Kumar, M.H. Al-Dahhan, M.P. Dudukovic, (1996) "Preliminary experimental studies of the flow in liquid-solid risers", Engineering Foundation Topical Conference: Computational Fluid Dynamics in Chemical Reaction Engineering, San Diego, CA, October.
15. Muthanna H. Al-Dahhan and Milorad P. Dudukovic, (1995) "Liquid-solid external contacting in trickle-bed reactors operated at high pressure", The 2nd International Conference on Gas-Liquid-Solid Reactor Engineering, Cambridge, United Kingdom, March 27-29.
14. Y. Wu, M. Khadilkar, M. Al-Dahhan, and M. P. Dudukovic, (1995) "Evaluation of trickle bed reactor models by using chemical reactions", 12th Midwest Chinese American Science Technology Conference, St. Louis, Missouri, June 11-12

13. Y. Wu, M. Khadilkar, M. Al-Dahhan, M. P. Dudukovic, (1995) “Effect of fines on the performance of down flow (trickle-bed) and upflow (packed bubble column) reactors”, The Catalyst Society 14th North American Meeting, Snowbird, Utah, June 11-16.
12. Al-Dahhan, M. and M. P. Dudukovic, (1995) “Multiphase reactors technology in waste minimization and pollution reduction”, Emerging Technologies in Hazardous Waste Management VII, Atlanta, Georgia, September 17 - 20.
11. Muthanna H. Al-Dahhan, (1995) “Computing and computer applications in engineering education”, the Fourth World Conference on Engineering Education, St. Paul, Minnesota, October 15-20.
10. M. H. Al-Dahhan and M. P. Dudukovic, (1995) “Trickle-bed reactors: scale-up issues”, Paper 249c, AIChE Annual Meeting, Miami Beach, Florida, November 12-17.
9. M. Khadilkar, Y. Wu, M. Al-Dahhan, and M. P. Dudukovic, (1995) “Effect of fines on the performance of trickle bed and upflow reactors”, Paper 66e, AIChE Annual Meeting, Miami Beach, Florida, November 12-17.
8. Muthanna H. Al-Dahhan, (1995) “An integrated approach to computing and computer applications in the undergraduate chemical engineering curriculum”, Paper 245d, AIChE Annual Meeting, Miami Beach, Florida, November 12-17.
7. M. H. Al-Dahhan, M. P. Dudukovic and P. A. Ramachandran, (1994) ”Influence of fines on liquid-solid contacting efficiency, liquid holdup and pressure drop in laboratory trickle-bed reactors at elevated pressure”, paper 52g, AIChE Spring National Meeting, Atlanta, Georgia, April 17-21.
6. M. H. Al-Dahhan and M. P. Dudukovic, (1994) “Pressure drop and liquid holdup in high pressure trickle-bed reactors”, paper PH1, 13th International Symposium on Chemical Reaction Engineering (ISCRE 13), Baltimore, Maryland, September 25-28.
5. A.Chone, Y Wu, M. Khadilkar, M. Al-Dahhan, and M. P. Dudukovic, (1994) “Comparison of trickle-bed and upflow reactors (packed bubble columns) at high pressure operation”, paper 76k, AIChE Annual Meeting, San Francisco, California, November 13-18.
4. M. H. Al-Dahhan, M. P. Dudukovic and P. A. Ramachandran, (1993) ”Effect of high pressure operation on external liquid-solid contacting efficiency in trickle bed reactors”, paper 30k, AIChE Annual Meeting,
3. M. H. Al-Dahhan and C. E. Wicks, (1993) “Influence of mixing rate (phase turbulence) on the mass transfer coefficient across a liquid-liquid interface”, paper 45b, AIChE Annual Meeting, St. Louis, Missouri, November 7-15.
2. M. H. Al-Dahhan, Y. X. Wu, and M. P. Dudukovic, (1993) “A reproducible procedure to pack laboratory scale trickle-bed reactors with fines”, paper 213a8, AIChE Annual Meeting, St. Louis, Missouri, November 7-15.
1. M. H. Al-Dahhan and C E. Wicks, (1993) “A modified contactor for experimental studies of mass transfer and kinetics across liquid-liquid interface”, paper 213a7, AIChE Annual Meeting, St. Louis, Missouri, November 7-15.

Acknowledgment of Chapter 27 in Professor Levenspiel Textbook

Hand-written and signature acknowledgment of Professor Levenspiel for my work on modeling and analysis of gas-solid monolithic reactors that has constituted Chapter 27th in the textbook of the Chemical Reactor OmniBook of Professor Octave Levenspiel, (Chapter 27. Tube Wall, Monolith and Plate Catalytic Reactors), July 2002, ISBN-0- 88246-173-7 (see below the)



To Al-Dahhan,
Thanks for your evaluation to Chapter 27. Most helpful.

THE
CHEMICAL REACTOR
OMNIBOOK

OCTAVE LEVENSPIEL

Nov '03

Chemical Engineering Department
Oregon State University
Corvallis, Oregon 97331-2702

July 2002

Distributed by:
OSU Book Stores, Inc.
Corvallis, Oregon 97339

ISBN: 0-88246-173-7

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