

BUKUR REACTION ENGINEERING & CATALYSIS SYMPOSIUM

DECEMBER 4-5 2017 EDUCATION CITY, DOHA, QATAR

GAS & FUELS RESEARCH CENTER



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The "Bukur Reaction Engineering and Catalysis Symposium" is named after a distinguished Texas A&M professor who has contributed significantly to the field of reaction engineering and catalysis for more than 40 years and led many research projects at Texas A&M at Qatar: Dr. Dragomir B. Bukur. This important event brings together some of the world's leading scientists and researchers in the field of gas-to-liquid technology.

The symposium also highlights Qatar's research activities in this field–specifically in natural gas conversion–and focuses on the State of Qatar as the world's gas-processing capital.

Professor Nimir Elbashir Symposium Chair Director, TEES Gas & Fuels Research Center



DR. DRAGOMIR B. BUKUR

Professor Emeritus, Texas A&M University Research Professor, Texas A&M University at Qatar

> Dragomir Bukur graduated with honors from the University of Belgrade (Diploma Engineer degree in chemical technology) and received a M.Sc. and Ph.D. in chemical engineering from the University of Minnesota.

> He started his professional career as an assistant professor at the University of Novi Sad in Yugoslavia (1975-1978) and worked as a postdoctoral research associate in the Chemical Engineering Department at the University of Houston (1979-1980). He worked for one year at Mobil Research and Development Co. in Paulsboro, N.J., before joining the Department of Chemical Engineering at Texas A&M University as an associate professor in 1981. He was a visiting professor in many universities, including North Carolina State University at Raleigh and the University of New South Wales. From 2005 until his retirement in 2017, he was a professor at Texas A&M University at Qatar where he taught and trained many students and established several research projects of great relevance to Qatar's economy.

His research expertise has been in the areas of catalysis, kinetic modeling and reactor design. He made novel and significant contributions to the advancement of the state of the art in synthesis gas conversion to transportation fuels in several areas. Bukur's group conducted novel and creative experiments coupled with sophisticated data analysis to provide some of the key parameters needed for design and scale-up of slurry bubble column reactors for Fischer-Tropsch synthesis (FTS) process. His research group was among the first to initiate studies on modeling of slurry bubble column reactors and kinetics of FTS. His group gained improved understanding of the role of catalyst pretreatment conditions, promoters and binders through systematic studies of model catalyst systems, and then utilized this knowledge to synthesize highly active and stable precipitated iron catalysts for high wax selectivity (high alpha catalyst). He has been author or co-author of 116 peer-reviewed journal publications, five book chapters, and he and/or his associates have made more than 160 presentations at national and international conferences. He has given 60 invited lectures and has served as a consultant for DuPont, ConocoPhillips and Celanese.

In recognition for his achievements in research, education and service to the profession he was elected a Fellow of the American Institute of Chemical Engineers (2000) and has received multiple awards for his research contributions from Texas A&M University (Senior TEES Fellow, Halliburton Professorship and Faculty Distinguished Achievements Award for Research). He was a holder of the Joe M. Nesbitt Professorship in Chemical Engineering at Texas A&M from 2006 until his retirement. He served as the vice chairman of the Natural Gas Conversion Board (2013-2016), a notfor-profit organization responsible for organizing the triennial Natural Gas Conversion Symposium, and is a member of its International Scientific Board, which is responsible for technical excellence of symposia.

He is married to Maria and they have two sons, Marko and Phillip.



PROGRAM — DECEMBER 4, 2017

8 – 9 a.m.	Light Breakfast	
9 – 9:45 a.m.	Opening Ceremony and Welcome	
Session 1: Heterogeneous Catalysis Challenges in Gas Processing Chair: Patrick Linke (HBKU Ballroom 3)		
9:45 – 10:25 a.m.	"Advanced Fundamental Kinetics for Hydrocarbon Production and Conversion Processes" Prof. Gilbert Froment Texas A&M University, USA	
10:25 – 11:05 a.m.	"Advancements in Hydrogen Production From Natural Gas via Novel Intensified Processes" Prof. Angeliki Lemonidou Aristotle University of Thessaloniki, Greece	
11:05 – 11:20 a.m.	Coffee Break	
11:20 – 11:50 a.m.	"Performance of Iron and Cobalt Catalysts for Fischer-Tropsch Reaction" Dr. Wenping Ma University of Kentucky, USA	
11:50 a.m. – 12:20 p.m.	"Active and Stable Nickel/Alumina Catalysts for Steam and Dry Reforming of Methane" Prof. Mahmoud Khader Qatar University, Qatar	
12:20 – 1:30 p.m.	<i>Prayer and Lunch Break, and Poster Session</i> (HBKU Ballroom 2)	

Session 2: Advances in Reaction Engineering and Reactor Modeling (Series 1) Chair: Ahmed Abdel-Wahab (HBKU Ballroom 3)		
1:30 – 2:05 p.m.	"Highly Conductive Structured Packed-beds for the Intensification of the Fischer-Tropsch Synthesis in Tubular Reactors" Prof. Carlo Visconti Politecnico di Milano, Italy	
2:05 – 2:40 p.m.	"Safety in Gas Processing Technologies" Prof. Sam Mannan Texas A&M University, USA	
2:40 – 3:05 p.m.	"Predictive Models for Physical Properties Related to Fischer-Tropsch Processes Based on Molecular Simulation" Prof. Ioannis Economou Texas A&M University at Qatar, Qatar	
3:15 – 3:30 p.m.	Transportation to HBKU-QEERI Labs	
3:30 – 5 p.m.	Reception at HBKU-QEERI labs	
6 p.m.	Dinner for Guest Speakers	

PROGRAM — DECEMBER 5, 2017

8:30 – 9:30 a.m.	Light Breakfast		
Session 1: Fischer-Tropsch for Synthetic Fuels and Value- added Chemicals Chair: Ioannis Economou (HBKU Ballroom 3)			
9:30 – 10:10 a.m.	"A Venerable Topic In Catalysis and Chemical Engineering: Historic Fischer-Tropsch Stories in Which We found Dragomir B. Bukur's Contribution" Prof. Yong Wang Li Chinese Academy of Sciences, China		
10:10 – 10:50 a.m.	"Fischer-Tropsch Synthesis — In-situ Perspectives" Prof. Michael Claeys University of Cape Town, South Africa		
10:50 – 11:30 a.m.	"The Design of Novel GTL Reactors and Processing" Prof. Nimir Elbashir Texas A&M University at Qatar, Qatar		
11:30 a.m. – 1 p.m.	<i>Prayer and Lunch Break</i> (HBKU Ballroom 2)		

Session 2: Advances in Reaction Engineering and Reactor Modeling (Series 2) Chair: Ahmed Abdalla (HBKU Ballroom 3)		
1 – 1:40 p.m.	"Light Olefin Synthesis From Syngas Over Promoted Iron Catalysts" Prof. Andrei Khodakov Université Lille, France	
1:40 – 2:20 p.m.	"Environmental Impact of Gas Processing Units" Mohammed Ayoub QEERI, HBKU	
2:20 – 3 p.m.	"Laying Foundations for the Future of GTL" Anton Punt, ORYX GTL Mohammad Hamed, Sasol	
3 – 3:20 pm	Closing Remarks Prof. César O. Malavé and Prof. Dragomir Bukur Texas A&M University at Qatar, Qatar	
3:20 – 3:30 p.m.	Coffee break	
Session 3: Poster Session and Awards (HBKU Ballroom 2)		
4 – 5 p.m.	Awards Presentation for Winning Posters	
6 p.m.	Dinner for Guest Speakers	



"Advanced Fundamental Kinetics for Hydrocarbon Production and Conversion Processes"

Prof. Gilbert Froment Texas A&M University, USA

Gilbert F. Froment received his Ph.D. in chemical engineering from the University of Gent, Belgium. In 1968 he became a professor of chemical engineering in Gent and launched the Laboratorium voor Petrochemische Techniek. His scientific work centered on fixed bed reactor modeling, kinetic modeling of catalytic reactions, catalyst deactivation and thermal cracking for olefins production. In 1998 he joined the Department of Chemical Engineering at Texas A&M University as a research professor. He has directed the work of 75 Ph.D. students and published 350 scientific papers in international journals. He has presented more than 320 seminars around the world. His book *Chemical Reactor Analysis and Design*, presently in its third edition, is used worldwide in graduate courses and industrial research groups. He is a member of the Belgian Academy of Science, the Belgian Academy of Overseas Science, a Foreign Associate of the United States National Academy of Engineering and a member of the Texas Academy of Medicine, Science and Engineering.

"Advancements in Hydrogen Production From Natural Gas via Novel Intensified Processes"

Prof. Angeliki Lemonidou Aristotle University of Thessaloniki, Greece

Dr. Angeliki Lemonidou is professor and deputy chair of the Chemical Engineering Department at Aristotle University of Thessaloniki and director of the Petrochemical Technology Laboratory. She also is a collaborating faculty member of the Center of Research and Technology Hellas (CPERI/CERTH). Lemonidou is the European Federation of Catalysis Societies vice president for 2017-2019. Her research activities are in the area of catalysis and catalytic reaction engineering targeted to processes for light hydrocarbons selective oxidations, alternative fuels and chemicals production from natural gas and biomass, as well as CO₂ capturing processes. She has been author of numerous publications in peer-reviewed, high-impact-factor journals and conference proceedings.

"Performance of Iron and Cobalt Catalysts for Fischer-Tropsch Reaction"

Dr. Wenping Ma University of Kentucky, USA

Dr. Wenping Ma is a senior research engineer of the Center for Applied Energy Research (CAER) at the University of Kentucky. He previously studied and worked in the world leading Fischer-Tropsch synthesis (FTS) laboratories of Professors Y.W. Li, L.W. Lin, D.B. Bukur and E. Kugler between 1995 and 2006. Since then he joined the top FTS laboratory of Prof. B.H. Davis in Kentucky. His research interests are reaction kinetics and mechanism, and catalyst development and characterization for the process of converting coal, natural gas and biomass to ultraclean fuels (XTL), hydrotreating and H₂ production by catalytic approaches. He has been working with the group members to develop and conduct many XTL projects for academia, government and industry, and playing active roles in community service. He is the author or co-author of more than 85 scientific papers and seven U.S. and Chinese patents.

"Active and Stable Nickel/Alumina Catalysts for Steam and Dry Reforming of Methane"

Prof. Mahmoud Khader *Qatar University, Qatar*

Dr. Mahmoud Khader is a research professor in the Gas Processing Center in Qatar University. He obtained his Ph.D. from Boston University, USA, followed by postdoctoral work at the University of California, Berkeley, USA. He also had fellowships at the University of Dundee, UK; University of Pennsylvania, USA; Texas A&M; Cornell University, USA; and the University of Washington, USA. His research interests include surface chemistry and catalysis, solar energy conversion and solid-state chemistry. He had several funded research projects in solar energy conversion (Silicon nanowires and GaAs), catalysis (Fisher-Tropsch, methane oxidation, carbon dioxide capturing and conversion and sensing monolayer deposition of carbon in chemical reactors at high temperatures) and surface chemistry (interchelation of polymers with clay). Khader has filed five patents (two in solar energy conversion and three in catalysis) and has published 70 papers.

"Highly Conductive Structured Packed-beds for the Intensification of the Fischer-Tropsch Synthesis in Tubular Reactors"

Prof. Carlo Visconti Politecnico di Milano, Italy

Dr. Carlo Visconti, born in Milano (Italy) in 1981, is a chemical engineering professor and safety and prevention engineering professor at Politecnico di Milano. His scientific interests are in the field of industrial catalysis and chemical reaction engineering. The main focus of his research activities is the design of advanced catalysts, processes and reactors for energy conversion, CO₂ mitigation and process intensification. In these fields, he has been involved in several projects funded by industrial companies, the European Commission and the Italian government. His approach to research includes both the multiscale modeling of catalytic processes and the experimental investigation at the lab and pilot scales. He is author of more than 40 ISI papers (h-index = 16) in addition to three patent applications, five book chapters and more than 150 contributions to conferences.

"Safety in Gas Processing Technologies"

Prof. Sam Mannan Texas A&M University, USA

Dr. M. Sam Mannan is Regents Professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University and executive director of the Mary Kay O'Connor Process Safety Center. The center's mission is to improve safety in the chemical process industry by conducting programs and research activities that promote safety as second nature for all plant personnel in their day-to-day activities. He is the editor of the third and fourth editions of the three-volume authoritative reference for process safety and loss prevention, Lees' Loss Prevention in the Process Industries. Mannan has published 306 peer-reviewed journal publications, five books, eight book chapters, 290 proceedings papers, 14 major reports, and 312 technical meeting presentations. He is the recipient of numerous awards and recognitions, including the American Institute of Chemical Engineers Service to Society Award and the Bush Excellence Award for Faculty in Public Service.

"Predictive Models for Physical Properties Related to Fischer-Tropsch Processes Based on Molecular Simulation"

Prof. Ioannis G. Economou Texas A&M University at Qatar, Qatar

Dr. Joannis G. Economou is the associate dean for academic affairs and professor of chemical engineering at Texas A&M at Qatar. He was previously associate provost for graduate studies and professor of chemical engineering at the Petroleum Institute, Abu Dhabi (2009-2012). From 1995 to 2009, he worked at the National Center for Scientific Research "Demokritos" in Athens. Greece. He holds a diploma from the National Technical University of Athens, Greece, and a Ph.D. from The Johns Hopkins University, USA, both in chemical engineering. He worked as a postdoctoral researcher in Delft University of Technology in the Netherlands and in Exxon Research and Engineering Company, in New Jersey, USA; as research fellow in University College London and Princeton University; and as visiting professor in the Technical University of Denmark and the American College of Greece. He has supervised 13 master's students, 14 Ph.D. students and 16 postdocs, and has published 180 peer-reviewed research papers in leading journals in chemical engineering, physical chemistry and polymer science.

"A Venerable Topic In Catalysis and Chemical Engineering: Historic Fischer-Tropsch Stories in Which We Found Dragomir B. Bukur's Contribution"

Prof. Yong Wang Li Chinese Academy of Sciences, China

Prof. Yong Wang Li is the founding manager in Synfuels China Technology Company Ltd., director of the National Engineering Laboratory of Indirect Coal Liquefaction and director of the National Energy Research Center for Clean Fuels. He is engaged in fundamental research in the fields of quantum chemistry, molecular simulation, catalysis, kinetics and process simulation related to the coal conversion processes, process development of coal/gas to liquids and related unit operation, and application of new technologies in process engineering. After more than 20 years of work, the high-temperature slurrybed coal-to-oil technology was developed. In 2016, in the world's largest single set of Shenhua Ningmei 4 million tons/year commercial plant, the integrated technology achieved industrial applications and met remarkable success. He has published 550 scientific papers and obtained 108 authorized patents. He has been honored with many awards, including the Science and Technology Innovation Award and National Award in Technology Advances and Innovation.

"Fischer-Tropsch Synthesis — In-situ Perspectives"

Prof. Michael Claeys University of Cape Town, South Africa

Michael Claeys is a professor of chemical engineering at the Catalysis Institute at the University of Cape Town where he was instrumental in establishing a large research activity with focus on Fischer-Tropsch catalysis. His research interests also include preparation and characterization of nanomaterials, their use in catalytic applications, and the development of novel instrumentation for characterization of catalysts at working conditions. Claeys has published extensively on these topics and holds a number of patents. A large portion of his research is conducted in conjunction with industrial partners. In particular he has been collaborating with Sasol R&D for many years. Claeys is also the director of the national DST-NRF Centre of Excellence in Catalysis, c*change, a large virtual and multidisciplinary center, where he is manager of the Scientific Synthesis Gas Programme.

"The Design of Novel GTL Reactors and Processing"

Prof. Nimir Elbashir *Texas A&M University at Qatar, Qatar*

Dr. Nimir Elbashir is a professor of chemical engineering and petroleum engineering at Texas A&M at Qatar, and director of Texas A&M Engineering Experiment Station (TEES) Gas and Fuels Research Center. The focus of his research activities is the design of advanced reactors, catalysts and conversion processes for natural gas, coal and CO₂ to ultra-clean fuels and value-added chemicals, and fuels processing. He has established several unique global research collaboration models between academia and industry. He holds several U.S. and European patents and a large number of scientific publications. He has received several awards, including Qatar Foundation's Best Energy and Environment Research Group, BASF Corp. Excellence in Environmental Catalysis, TEES Genesis Research Award, Texas A&M University Faculty Excellence Award, and more.

"Light Olefin Synthesis From Syngas Over Promoted Iron Catalysts"

Prof. Andrei Khodakov *Université Lille, France*

Dr. Andrei Khodakov is a CNRS Research Director and leader of the Catalysis for Energy research group in the UCCS CNRS laboratory in Lille, France. He acquired experience in top academic and industrial institutions in the United States, Russia, France and the UK. His research interests cover catalyst and reactor design aspects of biomass and syngas conversion processes, reaction mechanisms and kinetics, in situ and operando techniques. Khodakov's group also works on the valorization of renewable resources (biomass) by thermochemical and chemical processes. His team maintains ongoing industrial and international collaborations. Khodakov has been co-author of more than 140 articles in top chemical journals and has given numerous invited lectures at international conferences. He received the CNRS excellence awards in 2011 and 2016.

"Environmental Impact of Gas Processing Units"

Mohammed Ayoub Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University, Qatar

Mohammed Ayoub is a scientist at the Oatar Environment and Energy Research Institute (QEERI) where he leads the Air Quality and Climate Change research portfolio. He holds an M.Sc. in atmospheric science from the University of Alabama in Huntsville, USA, and has more than 20 years of experience in air quality research and management spanning academia, regulatory agencies, international consulting and the United Nations. His research focuses on understanding the chemistry and dynamics of the local and regional atmosphere to develop and evaluate national policies to mitigate the impacts of poor air quality in Qatar. His experience includes environmental impact assessment of oil and gas processes in North America and the Middle East, and he serves as a technical advisor to the Qatar Ministry of Municipality and Environment on matters related to air quality.

"Laying Foundations for the Future of GTL"

Anton Punt, *ORYX GTL* Mohamed Hamed, *Sasol*

Anton Punt (CEng, F IChemE) is a fellow of chemical engineering with substantial GTL technology and project management experience through contributing in the design, operations, optimization and improvements at ORYX GTL. He currently supports business development initiatives focused on technology, commercial and portfolio enhancements at ORYX GTL. Through his career he worked 12 years at Sasol as a senior and principal process engineer, head of process engineering, acting technical manager (predominantly focused on technology improvement at ORYX GTL) and the past six years as lead business analyst at ORYX GTL governing the capital projects portfolio, projects evaluation and leading commercial negotiations for new business initiatives.

Mohamed Hamed is the Sasol single point licensor at the ORYX GTL plant. Before his role as a licensor, he worked in several roles within the Sasol Research and Technology Group to develop and demonstrate FT catalyst and reactor concepts on multiscale reactors. He earned his bachelor's degree in chemical engineering from Alexandria University after which he pursued his Ph.D. on the design of bubble column reactors at Washington University in Saint Louis, USA. His main focus is the design of multiphase reactors.





Texas A&M Engineering Building, Education City PO Box 23874, Doha, Qatar tel. +974.4423.0010 fax +974.4423.0011 www.qatar.tamu.edu