Imperial College London

Centre for Process Systems Engineering

2019 Seminar Series

UCL

# Synthesis, design and analysis of energy efficient sustainable process alternatives


## Prof. Rafiqul Gani

Technical University of Denmark


**13 February 2019, 11am, RODH C617**


**Abstract:** This presentation gives a brief review of the available energy sources for consumption, their effects in terms of $CO_2$-emission and its management, and sustainable chemical processing where energy-consumption, $CO_2$-emission, as well as economics and environmental impacts are considered. Not all available energy sources are being utilized efficiently, while, the energy source causing the largest emission of $CO_2$ is being used in the largest amount. Most of the $CO_2$ management initiatives are therefore looking at "curing" the problem, after it has occurred, rather than "preventing" it. A scheme for $CO_2$-emission and its management that aims to prevent the problem is proposed. Examples highlighting the synthesis, design and analysis of sustainable chemical processing in the utilization of biomass-based energy-chemicals production, carbon-capture and utilization with zero or negative $CO_2$-emission to produce value added chemicals as well as retrofit design of energy intensive chemical processes with significant reduction of energy-consumption are presented. These examples highlight issues of energy-sustainable design, energy-$CO_2$ neutral design, energy-retrofit design, and energy-process intensification. Finally, some perspectives on the status and future directions of carbon dioxide management are given.


**Bio:** Dr. Rafiqul Gani retired at the end of 2017 as professor of systems design at the Department of Chemical & Biochemical Engineering, The Technical University of Denmark and the former head and co-founder of the Computer Aided Process Engineering Center (CAPEC). He has published close to 500 peer-reviewed journals-proceedings articles plus book chapters and delivered over 350 lectures, seminars and plenary/keynote lectures at international conferences, institutions and companies all over the world. Professor Gani is the former editor-in-chief of the Computers and Chemical Engineering journal (2009-2015), editor for the Elsevier CACE book series and currently serves in the editorial advisory boards of the following journals: Computers and Chemical Engineering, Sustainable Production & Consumption, and Current Opinion in Chemical Engineering. Professor Gani has been awarded three Doctor Honoris Causa degrees from University Politehnica Bucharest, University of Pannonia and Babes-Bolyai University. Professor Gani is the ex-president of the EFCE (European Federation of Chemical Engineering, finishing his 2$^{nd}$ term at the end of 2017); a member of the Danish Academy of Science; a Fellow of the AIChE and a Fellow of IChemE. He was awarded the AIChE (CAST Division) Computers in Chemical Engineering 2015 award in November 2015. Dr. Gani is the co-founder and CEO of the company "PSE for SPEED" providing innovative, accurate and consistent engineering solutions very fast to industrial clients. He is also a Distinguished (visiting) Professor at Zhejiang University and Tsinghua University in China and a Visiting Professor at Texas A&M University in USA. His current research interests continue with the development and application of computer aided methods and tools for modelling, property estimation, process-product synthesis & design, and process-tools integration with emphasis on energy, sustainability and application of a systems approach.