

## PREFACE

The XXII International Conference on Chemical Reactors, CHEMREACTOR-22, was organized by the Boreskov Institute of Catalysis of the Siberian Branch of the Academy of Sciences, Novosibirsk, Russia, together with University College London (UCL), UK. The conference took place during 19-23 September 2016 in London, and was held under the auspices of the European Federation of the Chemical Engineering (EFCE).

The conference brought together about 200 researchers and engineers from 30 countries all over the world. As in previous editions of CHEMREACTOR, the conference was devoted to fundamental aspects and practical application of catalytic processes and chemical reactors, as well as to the development of novel technologies in this area.

The scientific program of the conference included 6 plenary lectures, 9 keynote lectures, 68 oral and 100 poster presentations on the following topics:

### **Advances in Chemical Reactors Fundamentals**

- Chemical Reactions Kinetics
- Energy & Mass Transfer in Chemical Reactors and First Principles Calculations
- Fundamentals of Hydrodynamics and Fluid Flow in Chemical Reactors

### **Chemical Reaction Engineering and Reactors Design – Novel Approaches, Modeling, Scale-Up and Optimization**

- Mathematical Simulation: Multiscale Analytic and Computational Studies of Chemical Reactors
- Electrochemical and Photochemical Reaction Engineering
- Engineering and Use of Novel Structured Catalytic Materials
- Development of Chemical Reactors and Flow-Sheeting of Reactive Processes
- New Chemical Reactor Designs (e.g., Structured Reactors, Membrane Reactors, Microreactors)
- Process Intensification and Novel Approaches in Multifunctional Reaction Processes (e.g., Microwave/Induction Heated Reactors, Ultrasonic Reactors, Unsteady-State Forcing and Sorption Enhancement in Chemical Reactors, Multifunctional Reactors, Nature-Inspired Engineering of Reaction Processes, High-gravity, High-Shear Reactors)

## **Chemical Reactors and Technologies for Emerging Applications**

- Environmental Protection and Utilization of Wastes
- Reactors for Polymers and Other Novel Materials with Targeted Properties
- Processing of Biomass and Renewable Feedstocks
- Biochemical Engineering
- CO<sub>2</sub> Sequestration and Utilisation

## **Advanced Processing of Fossil Hydrocarbon Feedstocks**

- Modern Reactive Technologies for Natural Gas, Oil and Coal Processing
- Chemical Processes for Intensification of Fuel Production
- Chemical Reactors for In Situ Processing of Oil and Coal in Deposits
- Chemical Reactors and Processes for Treatment of Heavy Hydrocarbon Feedstock and Shale Oil

Traditionally, the CHEMREACTOR conference is opened by the honorary lecture dedicated to the memory of its founder, Professor Mikhail Slin'ko, the conference founder. Generally, this honor is granted to a world leading expert in the field of chemical reaction engineering. The choice of the memorial lecturer was performed by the members of the International Scientific Committee. According to their unanimous decision, this honorary right was granted to Professor **Gilbert Froment** with a lecture on “ADVANCED FUNDAMENTAL KINETICS FOR COMMERCIAL HYDROCARBON CONVERSION PROCESSES”.

Other plenary lectures included:

1. Professor **Lynn Gladden** (University of Cambridge, UK) MAGNETIC RESONANCE STUDIES OF FLUID (MAL)DISTRIBUTION AND HYDRODYNAMICS IN MULTIPHASE REACTORS
2. Professor **Jinghai Li** (Institute for Process Engineering, Beijing, China) REALIZING VIRTUAL REALITY OF CHEMICAL REACTORS: THE PATH IS AT MESOSCALES

3. Professor **Murray Moo-Young** (Waterloo University, Ontario, Canada) BIOREACTOR SYSTEMS DESIGN FOR THE PRODUCTION OF CLEAN FUELS
4. Professor **Sotiris E. Pratsinis** (Swiss Federal Institute of Technology in Zurich (ETH Zurich), Switzerland) ENGINEERING OF AEROSOL REACTORS
5. Professor **David West** (SABIC Technology Center, Sugarland, TX, USA) BIFURCATIONS IN THE OXIDATIVE COUPLING OF METHANE

Key-note presentations:

1. Professor **Mike Harold** (University of Houston, USA) REDUCTION OF NOX DIESEL ENGINES EMISSION BY VERY FAST PERIODIC PULSING
2. Professor **Frerich Keil** (Hamburg University of Technology, Germany) MULTISCALE MODELING OF REACTION AND DIFFUSION WITH IMPACTS ON CHEMICAL REACTOR ANALYSIS AND DESIGN
3. Professor **Ian Metcalfe** (Newcastle University, Newcastle, UK) UNMIXED REACTIONS' – HOW TO EXPLOIT PERIODICALLY-OPERATED AND MEMBRANE REACTORS
4. Professor **Menka Petkovska** (University of Belgrade, Belgrade, Serbia) EVALUATING THE POTENTIAL OF FORCED PERIODIC OPERATIONS OF CHEMICAL REACTORS - THE NONLINEAR FREQUENCY RESPONSE APPROACH
5. Professor **Michail Stamatakis** (University College London, UK) ACCURATE AND EFFICIENT COMPUTATIONAL FRAMEWORKS FOR REACTION KINETICS: TOWARD FIRST-PRINCIPLES BASED REACTOR DESIGN
6. Professor **Enrico Tronconi** (Politecnico di Milano, Milan, Italy) RECENT ADVANCES IN THERMALLY CONDUCTIVE MICROSTRUCTURED CATALYSTS
7. Professor **Ruud van Ommen** (Delft University of Technology, The Netherlands) SYNTHESIS OF NANOSTRUCTURED MATERIALS IN FLUIDIZED BED REACTORS
8. Professor **Andrey Zagoruiko** (Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia) NOVEL STRUCTURED CATALYTIC SYSTEMS - CARTRIDGES ON THE BASE OF FIBROUS CATALYSTS
9. Professor **Xing-gui Zhou** (East China University of Science and Technology, Shanghai, China) UNDERSTANDING AND CONTROLLING THE INFLUENCES OF MASS TRANSFER ON METAL-ZEOLITE CATALYSTS FOR SELECTIVE OXIDATIONS

More information on the Chemreactor-22 conference is available at the conference website ([http://conf.ict.nsc.ru/CR\\_22/en/scientific\\_program](http://conf.ict.nsc.ru/CR_22/en/scientific_program)).

The principle objective of the CHEMREACTOR conference is to give a wide overview about recent achievements in the field of the chemical reaction engineering, to discuss the latest advances. The event is targeted at provision of a venue for the fruitful interaction and exchange of ideas, for estimation and discussion of the current state of novel technologies developing on principally new methods of catalytic processes realization in reactors of new type. The conference participants noted the high level of the presentations, especially the plenary and keynote lectures.

This Special Issue *Chemical Engineering & Processing: Process Intensification* includes selected, peer-reviewed contributions focusing on process intensification, which were presented at the conference.

Professor Marc-Olivier Coppens

Conference Co-Chairman, Editor

Professor Andrey N. Zagoruiko

Guest-Editor