Preliminary Scientific Program of the
XXIV International conference on Chemical Reactors
ChemReactor-24
Milan, Italy, August 30-September 4, 2020

EFCE Event 769

Boreskov Institute of Catalysis of the Siberian Branch
of the Russian Academy of Sciences, Novosibirsk, Russia
Politecnico di Milano, Milan, Italy
European Federation on Chemical Engineering

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Conference Proceedings:
CHEMICAL ENGINEERING JOURNAL, ELSEVIER
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# LOCAL ORGANIZING COMMITTEE

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### JOINT PROGRAM COMMITTEE

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PLENARY LECTURES

PL-1. Professor Guy Marin  
*University of Ghent, Belgium*

A Professor Mikhail Slin’ko Honorary Lecture  
CHEMICAL REACTION AND REACTOR ENGINEERING:  
A KEY DISCIPLINE FOR PROCESS OPTIMIZATION, INNOVATION AND INTENSIFICATION

PL-2. Dr. Carlo Perego  
*Research Center for Non Conventional Energy, ENI Research Center for Non Conventional Energy - Istituto Eni Donegani, Rome, Italy*

PROCESS TECHNOLOGY FOR THE CIRCULAR ECONOMY

PL-3. Professor Freek Kapteijn  
*Delft University of Technology, Delft, The Netherlands*

PROCESS INTENSIFICATION THROUGH STRUCTURING CATALYST AND REACTOR

PL-4. Professor Fausto Gallucci  
*Eindhoven University of Technology, Eindhoven, The Netherlands*

MEMBRANE REACTORS AND SEPARATION ENHANCED REACTORS

PL-5. Professor Annemie Bogaerts  
*University of Antwerpen, Antwerpen, Belgium*

ENGINEERING OF PLASMA ASSISTED REACTIONS

PL-6. Professor Ib Chorkendorff  
*Denmark Technical University, Copenhagen, Denmark*

CONVERSION OF SUSTAINABLE ENERGY: ELECTRIFIED REACTORS

KEYNOTE LECTURES

KL-1. Professor Hannsjoerg Freund  
*Friedrich-Alexander-University of Erlangen-Nürnberg, Erlangen, Germany*

ADDITIVE MANUFACTURING OF TAILOR-MADE CATALYTIC REACTORS WITH OPTIMAL AND FLEXIBLE TRANSPORT PROPERTIES

KL-2. Professor Paul Dauenhauer  
*University of Minnesota, Minneapolis, MN, USA*

ENGINEERING OF BIOMASS PROCESSING

KL-3. Professor Vladimir Arutyunov  
*Semenov Institute of Chemical Physics RAS, Moscow, Russia*

NON-CATALYTIC OXIDATION OF HYDROCARBONS

KL-4. Professor Suljo Linic  
*University of Michigan, Ann Arbor, MI, USA*

PHYSICAL CHEMISTRY CONCEPTS OF CHEMICAL ENERGY CONVERSION

KL-5. Professor Luis M. Gandía  
*Universidad Pública de Navarra, Pamplona, Spain*

RENEWABLE HYDROGEN PRODUCTION THROUGH WATER ELECTROLYSIS WITHIN THE CONTEXT OF POWER-TO-GAS TECHNOLOGIES

KL-6. Dr. Arne Hoffmann  
*BASF SE, Germany*
SCIENTIFIC AREAS

**Advances in Chemical Reactor Fundamentals**
First-Principles-Based Chemical Reaction Engineering.
Chemical Reaction Kinetics.
Energy & Mass Transfer in Chemical Reactors.

**Chemical Reaction Engineering and Reactor Design – Novel Experimental Approaches, Modeling, Scale-Up and Optimization**
Mathematical Simulation: Multiscale Analytic and Computational Studies of Chemical Reactors.
Development of Chemical Reactors and Flow-Sheeting of Reactive Processes
New Chemical Reactor Designs (e.g., Structured Reactors, Membrane Reactors, Microreactors, Nature-Inspired Reactor Concepts, Modular Reactor Design for Multiproduct Purpose).
Process Intensification and Multifunctional Reactors (e.g., Microwave/Induction Heated Reactors, Ultrasonic Reactors, Unsteady-State Forcing and Sorption Enhancement in Chemical Reactors, High-gravity, High-Shear Reactors, Electricity-Driven Reactors)
Safety Considerations in Reactor Design and Operation.

**Chemical Reactors and Technologies for Targeted Applications**
Environmental Protection and Utilization of Waste.
Reactors for Polymers and Other Novel Materials with Targeted Properties.
Reactors for Processing of Biomass and Renewable Feedstocks into Valuable Chemicals
Electrochemical and Photochemical Reaction Engineering.
Engineering of Biochemical Reactors.
CO₂ Sequestration and Utilization.

**Advanced Reactors and Technologies for Energy-Related Applications**
Novel Approaches to Natural Gas, Oil and Coal Processing.
Reactors for Fuel Production from Non-Conventional and Renewable Feedstocks
Advanced Reactors and Technologies for Manufacturing of Hydrogen.
Reactors and Processes for Manufacturing, Conversion and Storage of Energy
Engineering of Fuel Cells.
Solar-Driven Chemical Reactors.
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Åbo Akademi University, Laboratory of Industrial Chemistry, Turku, Finland

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OP-I-3. Cheula R., Maestri M.
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Politecnico di Milano, Milan, Italy

OP-I-4. Branco P.D.¹, Yablonsky G.S.², Marin G.B.³, Constales D.³
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¹Flemish Institute for Technological Research (VITO), Mol, Belgium
²Washington University in St. Louis, USA
³Ghent University, Ghent, Belgium

OP-I-5. Chizhik S.¹,², Popov M.¹,², Nemudry A.¹
UNIVERSAL GIBBS ENERGY RELATIONS FOR NONSTOICHIOMETRIC OXIDES IN REACTIONS OF OXYGEN EXCHANGE WITH GAS PHASE
¹Institute of Solid State Chemistry SB RAS, Novosibirsk, Russia
²Novosibirsk State University, Novosibirsk, Russia

OP-I-6. Slinko M.M.¹, Makeev A.G.², Bychkov V.Y.¹, Korchak V.N.¹
SPATIOTEMPORAL PATTERNS DURING CO OXIDATION ON Ni AT ATMOSPHERIC PRESSURE
²Semenov Institute of Chemical Physics RAS, Moscow, Russia
³Lomonosov Moscow State University, Moscow, Russia

OP-I-7. Lashina E.A.¹,², Slavinskaya E.M.¹,², Boronin A.I.¹,²
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¹Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
²Novosibirsk State University, Novosibirsk, Russia

OP-I-8. Lopez-Isunza F.
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Universidad Autonoma Metropolitana – Iztapalapa, Mexico City, Mexico

OP-I-9. Salmi T.¹, Murzin D.¹, Wärnå J.¹, Russo V.¹,², Kilpiö T.¹, Gemo N.¹, Reinsdorf A.¹, Schmidt S.¹, Behravesh E.¹, Vajglova Z.¹, Suerz R.¹, Balme Q.¹, Kumar N.¹, Eränen K.¹
MICROREACTORS AS STRONG TOOLS IN THE DETERMINATION OF INTRINSIC KINETICS FOR HETEROGENEously CATALYZED RAPID GAS-PHASE REACTIONS
¹Åbo Akademi University, Turku/Åbo, Finland
²The University of Naples Federico II, Naples, Italy
OP-I-10. Cárzales Marroquín J.F., Sotelo-Boyás R., Alemán-Vázquez L.O.
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HYDROISOMERIZATION USING SINGLE EVENT KINETICS IN ASPEN PLUS
1National Polytechnic Institute of Mexico, Mexico City, Mexico
2Mexican Institute of Petroleum, Mexico City, Mexico

KINETICS AND MECHANISM OF ISOMERIZATION REACTION OF PENTANE-HEXANE FRACTION.
MATHEMATICAL MODEL OF THE REACTION
1Novosibirsk State University, Novosibirsk, Russia
2Ufa State University, Ufa, Russia
3Institute of Petrochemistry and Catalysis RAS, Ufa, Russia

KINETIC MODEL FOR THE OLIGOMERIZATION OF 1-BUTENE TO LIQUID FUELS AT LOW- AND
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University of the Basque Country, Bilbao, Spain

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IFP Energies Nouvelles, Solaize, France

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and Ce DOPING
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2University of Tokyo, Japan

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1University of Bath, United Kingdom
2Fritz-Haber Institute, Berlin, Germany
3University of Warwick, Coventry, United Kingdom

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1University of the Basque Country, Bilbao, Spain

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1McGill University, Montreal, Canada
2University of Bremen, Germany
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\textsuperscript{1}Clausthal University of Technology, Clausthal-Zellerfeld, Germany
\textsuperscript{2}Brown University, Providence, USA


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\textsuperscript{1}King Abdullah University of Science & Technology, Thuwal, Saudi Arabia
\textsuperscript{2}University of Michigan, Ann Arbor, MI, USA
\textsuperscript{3}Argonne National Laboratories, Chicago, USA
\textsuperscript{4}Aramco Research Centre, Detroit, USA
\textsuperscript{5}Fuel Technology Division, R & DC, Saudi Aramco, Dhahran, Saudi Arabia

OP-I-23. Koledina K.F.\textsuperscript{1}, Koledin S.N.\textsuperscript{2}, Gubaydullin I.M.\textsuperscript{1}

MULTIOBJECTIVE OPTIMIZATION IN THE REACTION KINETICS OF METAL COMPLEX CATALYSIS SYNTHESIS USING A MILLISTRUCTURED REACTOR
\textsuperscript{1}Institute of Petrochemistry and Catalysis RAS, Ufa, Russia
\textsuperscript{2}Ufa State Petroleum Technological University, Ufa, Russia

OP-I-24. Müller M.\textsuperscript{1}, Kutscherauer M.\textsuperscript{1,2}, Mestl G.\textsuperscript{2}, Turek T.\textsuperscript{1}

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\textsuperscript{1}Clausthal University of Technology, Clausthal-Zellerfeld, Germany
\textsuperscript{2}Clariant AG, Bruckmühl, Germany

OP-I-25. Russo V.\textsuperscript{1,2}, Rossano C.\textsuperscript{1}, Cogliano T.\textsuperscript{1}, Turco R.\textsuperscript{1}, Vitiello R.\textsuperscript{1}, Tesser R.\textsuperscript{1}, Salmi T.\textsuperscript{2}, Di Serio M.\textsuperscript{1}

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\textsuperscript{1}The University of Naples Federico II, Naples, Italy
\textsuperscript{2}Åbo Akademi University, Turku/Åbo, Finland

OP-I-26. Tesser R.\textsuperscript{1}, Taddeo F.\textsuperscript{1}, Russo V.\textsuperscript{1,2}, Vitiello R.\textsuperscript{1}, Turco R.\textsuperscript{1}, Di Serio M.\textsuperscript{1}

KINETICS OF PELARGONIC ACID ESTERIFICATION WITH 2-ETHYLHEXANOL IN BATCH AND CONTINUOUS REACTORS
\textsuperscript{1}The University of Naples Federico II, Naples, Italy
\textsuperscript{2}Åbo Akademi University, Turku/Åbo, Finland


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\textsuperscript{2}Politecnico di Milano, Milan, Italy
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Hernández Aguirre A.¹
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¹Universidad Autónoma Metropolitana-Iztapalapa, Iztapalapa, Mexico
²Universidad Veracruzana-Región Xalapa, Veracruz, México

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WITH LOW d_i/d_p
¹Universidad Autónoma Metropolitana-Iztapalapa, Iztapalapa, Mexico
²Universidad Veracruzana-Región Xalapa, Veracruz, México

INFLUENCE OF THE GAS PHASE ON HYDRODYNAMICS AND GAS TRANSFER IN A STIRRED TANK
UNDER ANAEROBIC DARK FERMENTATION CONDITIONS
¹Clermont Auvergne University, Clermont-Ferrand, France

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East China University of Science and Technology, Shanghai, China

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\textsuperscript{1}Politecnico di Milano, Milan, Italy
\textsuperscript{2}Delft University of Technology, Delft, The Netherlands


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\textsuperscript{1}Universidad Autónoma Metropolitana-Iztapalapa, Iztapalapa, Mexico
\textsuperscript{2}Ghent University, Ghent, Belgium

Section II.

Chemical Reaction Engineering and Reactor Design – Novel Experimental Approaches, Modeling, Scale-Up and Optimization


A METHOD FOR THE SELECTION, DESIGN AND DEVELOPMENT OF CHEMICAL REACTORS
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\textsuperscript{1}Politecnico di Milano, Milan, Italy
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\textsuperscript{1}University of Naples Federico II, Napoli, Italy
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\textsuperscript{3}MEXEO, Kędzierzyn-Koźle, Poland

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\textsuperscript{1}Basque Country University, Bilbao, Spain
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\textsuperscript{3}University of Antwerp, Belgium
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2Tokyo Institute of Technology, Tokyo, Japan
3Egypt-Japan University of Science and Technology, Alexandria, Egypt

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$^{1}$Semenov Institute of Chemical Physics RAS, Moscow, Russia

$^{2}$Lomonosov Moscow State University, Moscow, Russia

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$^{1}$University of Cantabria, Santander, Spain

$^{2}$University of Alicante, Spain

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$^{1}$Politecnico di Milano, Milan, Italy

$^{2}$CNRS-Université de Lorraine, CNRS Nancy, France

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$^{1}$Casale SA, Lugano, Switzerland

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2RWTH Aachen University, Aachen, Germany
3Universität Leipzig, Germany
4Ecole Nationale Supérieure de Chimie de Montpellier, Institut Charles Gerhard, des Matériaux, Montpellier, France

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3Andra, Châtenay-Malabry, France

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2Aalto University, PO, Espoo, Finland

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1Politecnico di Torino, Turin, Italy
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$^2$Federal University of Viçosa, Florestal, Brazil
$^3$University of Campinas, Brazil
$^3$University of Ouro Preto, Brazil

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$^1$Swiss Federal Institute of Technology (ETH Zurich), Switzerland
$^2$Politecnico di Milano, Milan, Italy

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$^1$Public University of Navarre, Pamplona, Spain
$^2$University of the Basque Country, San Sebastián, Spain
$^3$Universidad Libre, Bogotá, Colombia

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$^1$Fraunhofer IMM, Mainz, Germany
$^2$Eindhoven University of Technology, Eindhoven, The Netherlands

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$^1$Swiss Federal Institute of Technology in Zurich, Switzerland
$^2$Università della Svizzera Italiana, Lugano, Switzerland
$^3$Pacific Northwest National Laboratory, Richland, USA
$^4$Italian Institute of Technology, Genova, Italy
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2Novosibirsk State University, Novosibirsk, Russia
3«UNICAT» LLC, Novosibirsk, Russia

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2Novosibirsk State University, Russia

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2Swiss Federal Laboratories for Materials Science and Technology (EMPA), Dübendorf, Switzerland
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¹Instituto Superior Técnico, University of Lisbon, Portugal
²Galp, Sines Refinery, Sines, Portugal
³Aveiro University, Aveiro, Portugal

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¹SINTEF Industry, Oslo, Norway
²École Normale Supérieure de Rennes, Rennes, France
³Aarhus University, Denmark
⁴Anna University, Chennai, India

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¹A.V. Topchiev Institute of Petrochemical Synthesis RAS, Moscow, Russia
²Lomonosov State University, Moscow, Russia

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¹Ghent University, Ghent, Belgium
²Total Research and Technology Feluy, Ghent, Belgium
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²Saint-Petersburg State University of Industrial Technology and Design, Saint-Petersburg, Russia

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\textsuperscript{2}Universidad de Concepcion, Chile
\textsuperscript{3}Imperial College London, United Kingdom

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\textsuperscript{2}Instituto Superior de Agronomia, University of Lisbon, Portugal

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\textsuperscript{5}King Abdulaziz University, Jeddah, Saudi Arabia

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\textsuperscript{3}Toraighyrov Pavlodar State University, Pavlodar, Kazakhstan

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²University of Chinese Academy of Sciences, Beijing, China

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²University of East Sarajevo, Faculty of Technology, Zvornik, Bosnia-Herzegovina

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1Bashkir State University, Ufa, Russia
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²Opole University of Technology, Opole, Poland

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