

## CONFIDENTIAL TO MEMBERS OF THE CATALYTIC ADVANCES PROGRAM

### CATALYTIC ADVANCES PROGRAM (CAP) R&D REPORTS

#### **2026**

##### **Catalytic CO<sub>2</sub> Conversion: Pathways to Olefins and Aromatics**

AUTHORS: To be announced

PEER REVIEWERS: To be announced

##### **Challenges and Opportunities in Biofuel Commercialization**

AUTHOR: To be announced

PEER REVIEWERS: To be announced

##### **Catalytic Solutions for Biobased Chemicals and Next-Gen Monomers**

AUTHOR: To be announced

PEER REVIEWERS: To be announced

#### **2025**

##### **Advances in Catalysts for Value Addition of Waste Polymers and Biomass**

AUTHORS: James Clark and Ugochukwu Patrick Okoye

PEER REVIEWERS: Rabya Aslam and Chinenye Adaobi Igwegbe

##### **Catalyst Deactivation Related to Processing New Feedstocks**

AUTHOR: Samuel Lalthazuala Rokhum

PEER REVIEWERS: Dr. Zaidoon Mohsin Shako and Prof. Gabrielle Centi

##### **Membrane Reactors for e-Fuel Production via CO<sub>2</sub> Hydrogenation**

AUTHOR: Fausto Gallucci

PEER REVIEWERS: Dr. John Wind and Dr. Bhupender Minhas

#### **2024**

##### **Advances in CO<sub>2</sub> Activation Catalysts**

AUTHORS: Taye Beyene Demissie, Salvatore Abate, Ramato Ashu Tufa

PEER REVIEWERS: Thomas Wirth, Hemant Choudhary

##### **Advances in Catalysts for Biofuels and e-Fuels**

AUTHORS: Samuel Lalthazuala Rokhum, Siglinda Perathoner

PEER REVIEWERS: Thomas Degnan, Woody Shiflett

##### **Advances in Catalysis for Polyolefin Production**

AUTHORS: Clifford Lee

PEER REVIEWERS: Jayant Divey, Luyi Sun

#### **2023**

##### **Catalysts and Catalyst Manufacturing Methods for Decarbonization**

AUTHORS: Prof. Gabrielle Centi, Woody Shiflett, Giuliano Giambastiani, Tade Oyewunmi

PEER REVIEWERS: Prof. Feng Jiao, Thomas Degnan

##### **Startups in Catalysis and Catalytic Processes**

AUTHORS: Olivier Messenger

PEER REVIEWERS: Robert Weber, Terry Helton

##### **Advances in Materials for Catalysis**

AUTHORS: Francesco Parrino, Leonardo Palmisano, Vincenzo Vaiano

PEER REVIEWERS: Abhaya Datye, Klaus Köhler

#### **2022**

**Advances in Catalytic Science for the Upgrading, Conversion, and Co-Processing of Circular Feedstocks**

AUTHOR: Dr. Devy Kartika Ratnasari, Prof. James Clark and Prof. Fergal Byrne

PEER REVIEWERS: Prof. Karen Wilson, Prof. Damien Debecker

**Electrification of Catalytic Processes**

AUTHORS: Prof. Evgeny Rebrov, Prof. Vincenzo Spallina, and Dr. Syed Zaheer Abbas

PEER REVIEWERS: Prof. Kevin Van Geem and Prof. Thomas Van Gerven

**Catalysts and Materials to Address the Energy Transition: Fuel Cells, Batteries, and Energy Storage**

AUTHORS: Prof. Ram Gupta, Prof. Anuj Kumar, and Prof. Carlo Giorgio Viconti

PEER REVIEWERS: Prof. Nirala Sing, Prof. Doug Ivey, and Dr. Chalachew Asmelash

**2021**

**Advances in Catalysis for Plastic Conversion to Hydrocarbons**

AUTHOR: Drs. Dureem Munir and Rabya Aslam

PEER REVIEWERS: George Manos, Thallada Bhaskar

**Advances in Non-noble-metal Catalysts for Reforming and Conversion of Hydrocarbons**

AUTHORS: Dmitry Murzin, Irina Simakova, Päivi Mäki-Arvela

PEER REVIEWERS: Kevin Van Geem, David Farrusseng

**Electrocatalytic Approaches to Traditional Thermochemical Processes (including Hydrogen)**

AUTHORS: Prof. Siglinda Perathoner

PEER REVIEWERS: Profs. Yujie Sun and Bryan Goldsmith

**2020**

**Catalysts, Catalytic Processes, and Materials for Renewable Energy Production and Storage**

AUTHOR: Profs. Siglinda Perathoner, and José Ramón Galán-Mascarós

PEER REVIEWER: John Wind

**Advances in Digitalization of Catalysis; How IR4.0 is Revolutionizing the Way We Go About Catalysis**

AUTHORS: Drs. Paige Marie Morse, Stephan Andreas Schunk, Christian Schulz, Andreas Sundermann, and David B. Morse

PEER REVIEWER: Gadi Rothenberg

**Novel Potential Catalysts for Oil to Chemicals Conversion**

AUTHORS: Prof. Avelino Corma, Yannick Mathieu, Laurent Sauvanaud

PEER REVIEWERS: Carlos Carrero and Woodrow K. Shiflett

**2019**

**Advances in Catalyst Supports II**

AUTHOR: Dr. Margaret Fredricks, Dr. Carmen Haeßner, and Dr. Florian Boch

PEER REVIEWERS: Dr. Klaus Kohler, Dr. Philip Hughes, and Prof. Abhaya Datye

**Circularity in Chemicals**

AUTHORS: Profs. Gabriele Centi, Vladimir Beskoski, Adelina Voutchkova-Kostal, and David Serrano Granados

PEER REVIEWERS: Dr. John Warner, Dr. Robert Weber, and Dr. John Wind

**Advances in Electrocatalysis and Photocatalysis for Chemicals Production**

AUTHORS: Prof. Leonardo Palmisano, Prof. Christian Durante, Prof. Francesco Parrino

PEER REVIEWERS: Profs. Yujie Sun and Paulo Fornasiero

## **2018**

### **Advances in Catalyst Synthesis and Characterization**

AUTHORS: Profs. Gabriele Centi, Kerry Dooley and James Dorman

PEER REVIEWERS: Prof. Miguel Banares and Dr. Anne Gaffney

### **Advances in Catalyst Modeling and Simulation**

AUTHOR: Prof. Dorota Rutkowska-Zbik

PEER REVIEWERS: Prof. Andreas Heyden and Dr. Sorab Vatcha

### **Catalytic Conversion of Syngas to Chemical Products III**

AUTHORS: Profs. Angeliki Lemonidou and Eleni Heracleous

PEER REVIEWERS: Profs. James Spivey and Philippe Kalck

## **2017**

### **Catalytic Process R&D Scale-Up II**

AUTHORS: Profs. Raghunath Chaudhari and Patrick Mills

PEER REVIEWER: Dr. Cawas Cooper

### **Advances in Octane Enhancement**

AUTHOR: Mr. Dan Fraenkel

PEER REVIEWERS: Dr. Domenico Sanfilippo and Mr. John Creighton

### **Advances in High-Throughput Screening Methodologies**

AUTHORS: Prof. Joris Thybaut and Dr. Kenneth Toch

PEER REVIEWER: Prof. Dr. Thomas Degnan

## **2016**

### **Advances in Olefin Co-monomer and Polyolefin Production**

AUTHOR: Dr. Ken Sinclair

PEER REVIEWER: Brian Kneale

### **Advances in On-Purpose Technology for Mono- and Di-Olefins**

AUTHORS: Prof. Angeliki Lemonidou and Eleni Heracleous

PEER REVIEWERS: Dr. Erling Rytter and Prof. Israel Wachs

### **Recent Progress in Zeolitic Membranes for Gas Separations and Catalysis**

AUTHOR: Prof. King Lun Yeung

PEER REVIEWERS: Prof. Miguel Banares and Dr. Sorab Vatcha

## **2015**

### **Advances in Aromatics Production**

AUTHORS: Dr. Cawas Cooper, Prof. Abdullah Aitani and Dennis O'Brien

PEER REVIEWERS: Drs. Jim Butler and Vijay Bhise

### **Advances in Methanol to Products**

AUTHOR: Dr. Gabriele Centi

PEER REVIEWERS: Dr. Ronald A. Sills and Prof. Dr. Martin Bertau

### **Advances in Refinery Cracking Catalysts and Processes II**

AUTHORS: Ray Fletcher, Frits Dautzenburg, and James Speight

PEER REVIEWERS: Warren Letzsch and Phil Thiel

## **2014**

### **Dehydrogenation and Oxidative Dehydrogenation II**

AUTHORS: Dr. Domenico Sanfilippo, Dr. Stefano Rossini and Prof. José Luis G Fierro

PEER REVIEWERS: Drs. Miguel Bañares and Erling Rytter

### **Advances in Olefin Purification via Catalysis and Sorbent Materials**

AUTHORS: Drs. Gabriele Centi and Wei Zhang

PEER REVIEWERS: Profs. Jim Anderson, Robert Rioux and Mr. David Artrip

**Advances in Catalyst Supports**

AUTHORS: Profs. Klaus Köhler, Margaret Anne Fredricks, and Simon Meyer

PEER REVIEWERS: Dr. Phillip Hughes, Daniel Duprez, and Stephen Kaskel

## **2013**

### **Catalytic Conversion of Syngas to Chemical Products II**

AUTHORS: Dr. Vijay Bhise, Prof. Phillipe Kalck, and Dr. Cawas Cooper

PEER REVIEWERS: Profs. James Spivey and Clark Landis

### **Advances in Catalysis with Precious Metals**

AUTHORS: Drs. Jennifer Edwards, Jonathan Bartley and Peter Miedziak

PEER REVIEWERS: Profs. Robert Davis and Klaus Koehler

### **Advances in Catalysis for Oxidation Intermediates and Derivatives**

AUTHORS: Drs. Rick Porcelli and Vijay Bhise

PEER REVIEWERS: Drs. Joe Porcelli and Frits Dautzenberg

## **2012**

### **Advances in C<sub>1</sub> Chemistry**

AUTHORS: Dr. Gabriele Centi

PEER REVIEWERS: Drs. Burtron Davis and Jose Fierro

### **Going to Zero Sulfur II**

AUTHORS: Dr. Russell Chianelli and Mr. David Hirshfeld

PEER REVIEWERS: Prof. Ted Oyama and Mr. Phil Thiel

### **R&D Advances in Catalysis of Biochemicals**

AUTHORS: Dr. Cawas Cooper and Prof. Jose L. G. Fierro

PEER REVIEWERS: Drs. Joseph Bozell and Dennis Banasiak

## **2011**

### **Advances in Catalytic Reaction Engineering**

AUTHORS: Drs. David Agar, Raghunath Chaudhari, Sebastian Engell, Ram Gupta and Patrick Mills

PEER REVIEWERS: Drs. James Richardson and Theodore Tsotsis

### **Advances in Catalytic Production of Olefins**

AUTHORS: Drs. Abdullah Aitani, Burtron Davis, Gary Jacobs and Peter Pujado

PEER REVIEWERS: Drs. Kostas Triantafyllidis and Bipin Vora

### **Advances in Refinery Cracking Catalysts and Processes**

AUTHORS: Drs. Frits Dautzenburg, Warren Letzsch, and James Speight

PEER REVIEWERS: Dr. Robert Bradway and Mr. Robert Campagna

## **2010**

### **Understanding Nano-scale Catalytic Effects**

AUTHORS: Drs. Harold Kung, Robert Rioux and Götz Vesper

PEER REVIEWERS: Drs. Michael Gordon and Rutger van Santen

### **Frontiers in Catalysis II (including: (1) Catalysis in Aqueous Media; (2) Biomimetic Catalysis; and (3) Catalysis Modeling/Simulation)**

AUTHORS: Drs. Aravind Asthagiri, Shu Kobayashi and Christophe Thomas

PEER REVIEWERS: Drs. Avelino Corma and Dirk de Vos

### **Alternative Catalyst Manufacturing Methods**

AUTHORS: Drs. Vadim Guliants, Will Medlin, Randall Meyer and Robert Rioux

PEER REVIEWERS: Mr. Billy Adkison and Dr. Alexander Katz

## **2009**

### **New Methods of Catalyst Characterization**

AUTHORS: Drs. Miguel Bañares, Abhaya Datye and King Yeung

PEER REVIEWERS: Drs. Armando Borgna and Bert Weckhuysen

### **Catalytic Process R&D Scale-Up: Challenges and Issues**

AUTHORS: Drs. Muthanna Al-Dahhan, Cawas Cooper, Dmitry Murzin, Vishwas Pangarkar and Tapio Salmi and Mr. John Allen Rudesill

PEER REVIEWERS: Drs. Frits Dautzenberg and Gerhart Eigenberger

### **Advances in Chemical and Refining Separations Technology II**

AUTHORS: Drs. Kris Anderson, Ted Funk, Kent Knaebel and Peter Goodrich

PEER REVIEWERS: Drs. William Koros and Pushpinder Puri

## **2008**

### **Direct Conversion of Methane, Ethane and Carbon Dioxide to Fuels and Chemicals**

AUTHORS: Drs. Gabriele Centi, Giampetro Cum, Jose L.G. Fierro and Jose M. Lopez Nieto

PEER REVIEWERS: Drs. Miguel Banares, Richard Joyner and James Lyons

### **Catalysis in Biofuels Applications**

AUTHORS: Drs. Jon van Gerpen, S.R.A. Kersten, K. Seshan and Wim van Swaaij

PEER REVIEWERS: Drs. Anthony Bridgwater, George Huber and Martin Mittlebach

### **Catalytic Conversion of Syngas to Chemical Products**

AUTHORS: Drs. Steven Chuang, Burtron Davis and Sunggyu Lee

PEER REVIEWERS: Drs. Arno de Klerk, Harold Kung and Yong Wang

## **2007**

### **Zeolite Advances in Petroleum and Organic Chemicals III**

AUTHORS: Drs. Arthur Chester, Matteo Guidotti, Michel Guisnet and Rosemarie Szostak

PEER REVIEWERS: Drs. Dirk de Vos, Eric Derouane and Wolfgang Hölderich

### **Advances in Catalysis by Solid Acids and Bases**

AUTHORS: Drs. James Clark, Avelino Corma, Francois Figueras and Cristina Martinez

PEER REVIEWERS: Drs. David Jackson, Hideshi Hattori and Eduardo Wolf

### **Catalyst Deactivation, Regeneration and Disposal**

AUTHORS: Drs. Calvin Bartholomew, John Birtill and Ali Hassan

PEER REVIEWERS: Mr. Chris Cutchey and Drs. Dady Dadyburjor and James Spivey

## **2006**

### **Advanced Catalyst Design II**

AUTHORS: Drs. David Farrusseng, Nicholas Mosey, Thomas Woo and Francisco Zaera

PEER REVIEWERS: Drs. Mark Barteau, Frits Dautzenberg and Rutger van Santen

### **Advances in Catalysis for Fuel Reforming and the Water Gas Shift Reaction**

AUTHORS: Drs. Burtron Davis, Dennis Y.C. Leung and Sorab Vatcha

PEER REVIEWERS: Drs. Raymond Gorte, Michael Specht and David Trimm

### **Catalysis for the Upgrading of Heavy Oil**

AUTHORS: Drs. Geoff Dolbear and James Speight

PEER REVIEWERS: Drs. Art Chester, Milind Deo and Pedro Pereira-Almao

## **2005**

### **Advances in Hydrogenation in Refinery Processes and Bulk Chemicals**

AUTHORS: Drs. David Jackson, Jack McWilliams and Dennis Miller

PEER REVIEWERS: Drs. Art Chester, Jack Fletcher and Jozsef Margitfalvi

### **Chemicals and Synthetic Fuels from Coal and Biofeedstocks**

AUTHORS: Drs. Dennis Brown and Sorab Vatcha

PEER REVIEWERS: Drs. Mark Dry, Ari Geertsema and Brent Shanks

### **Frontiers in Catalysis (including: (1) Novel Nanomaterials in Catalysis; (2) New Reaction Media for “Green” Catalysis; and (3) Operando Spectroscopy)**

AUTHORS: Drs. David Cole-Hamilton, Steven Suib and Bert Weckhuysen

PEER REVIEWERS: Drs. Miguel Banares, Frits Dautzenberg and Anne Gaffney

## **2004**

### **Advances in Processes for the Selective Oxidation of Hydrocarbons**

AUTHORS: Drs. Miguel Banares, James Lyons and Joseph Porcelli

PEER REVIEWERS: Drs. John Brophy, Fabrizio Cavani and Kieran Hodnett

### **New Technology for Olefins Production**

AUTHORS: Drs. Arthur Chester, John Horsley and Sorab Vatcha

PEER REVIEWERS: Drs. Avelino Corma, Frits Dautzenberg and Geoff Dolbear

### **Accelerating Process and Catalyst Development with High-Throughput and Combinatorial Methods**

AUTHORS: Drs. Chris Snively, Jochen Lauterbach and Eduardo Wolf and Mr. Graeme Purdy

PEER REVIEWERS: Drs. Eric Derouane, Jonathan Male and Ian Maxwell

## **2003**

### **Going to Zero Sulfur: Challenges and Progress**

AUTHORS: Drs. Geoffrey Dolbear, Richard Porcelli and Chunshan Song

PEER REVIEW: Drs. Arthur Chester, Russell Chianelli and Roel Prins

### **Process Intensification in Chemicals Production and Refinery Processes**

AUTHORS: Drs. Volker Hessel, Jacob Moulijn and Sorab Vatcha

PEER REVIEW: Drs. Edward Funk, Klaus Kuehlein and Joseph Porcelli

### **GTL Technology: 21<sup>st</sup> Century Advances**

AUTHORS: Drs. J.L.G. Fierro, Ari Geertsema and Richard Porcelli

PEER REVIEW: Drs. Dennis Brown, Rachid Oukaci and David Trimm

## **2002**

### **Advances in Nanocatalysts and Products**

AUTHORS: Drs. Terry Baker, John Horsley, Steven Suib and Sorab Vatcha and Mr. Clyde Payn

PEER REVIEW: Drs. Donald Freed, Markus Pridöhl and Nicola Pernicone

### **CombiCat Informatics Systems**

AUTHORS: Drs. Laurel Harmon, Martin Holena and Uwe Rodemerck and Mr. Clyde Payn

PEER REVIEW: Drs. Jochen Lauterbach and John Newsam and Mr. James Cawse

### **Engineering Catalyst Pellets, Particles and Extrudates**

AUTHORS: Drs. Arthur Chester, Massimo Morbidelli, Jack McWilliams, Arvind Varma and Hua Wu

PEER REVIEW: Drs. Jim Kosco, Daniel Luss and Sorab Vatcha

## **2001**

### **Advances in Catalyst Support Technology**

AUTHORS: Drs. Avelino Corma, John Regalbuto, James Schwartz

PEER REVIEW: Drs. Robert Davis, Steven Suib, Mr. Howard Sherry

### **Advances in Catalytic Reactor Technology**

AUTHORS: Drs. Michael Dudukovic, Ted Funk, Jacob Moulijn

PEER REVIEW: Drs. Harold Kung, Joseph Porcelli and Sorab Vatcha

### **Advances in Catalytic Technology for Hydrogen and Fuel Cells**

AUTHORS: Drs. Jose Luis Fierro and Levi Thompson and Mr. Clyde Payn

PEER REVIEW: Drs. Chunshan Song and Robert Farrauto

## **2000**

### **C<sub>1</sub> Chemistry Series: Syngas and GTL Advances**

AUTHORS: Drs. Burt Davis, Richard Porcelli, Kenneth Gwodz

PEER REVIEW: Drs. James Spivey, Chunshan Song, George Marcelin

### **Selective Oxidation of Olefins and Aromatics**

AUTHORS: Drs. Fabrizio Cavani, James Lyons, Richard Porcelli

PEER REVIEW: Drs. George Marcelin, Gerard Smith

### **C<sub>1</sub> Chemistry Series: CO<sub>2</sub> Feedstock Utilization, Carbonylation, and Hydroformylation**

AUTHORS: Drs. Sorab Vatcha, K.V. Raghavan, M. Pardhasaradhi

PEER REVIEW: Drs. James Spivey, Chunshan Song, George Marcelin

## **1999**

### **Dehydrogenation and Oxidative Dehydrogenation**

AUTHORS: Drs. Miguel Bañares, Richard Porcelli

PEER REVIEW: Drs. James Lyons, Israel Wachs and David Stern

### **Catalytic Processes Combining Reaction and Separation**

AUTHORS: Drs. Edward Funk, Abraham Gelbein, and Brian Hanson

PEER REVIEW: Drs. S. Kumar Kunchal, Sorab Vatcha, and Prof. William Moser

### **Catalysis with Non-Zeolitic Molecular Sieves**

AUTHORS: Dr. Rosemarie Szostak, Prof. Ing. Stefan Ernst, Henry Foley and Steven Suib

PEER REVIEW: Drs. Sigmund Csicsery, Edith Flanigen, and Howard Sherry

### **Catalysis in the 21<sup>st</sup> Century**

AUTHORS: Drs. Klaus Kuehlein, Rolf Bader, Wolfgang Holderich

## **1998**

### **Advances in Alkane Oxidation Processing Technology**

AUTHORS: Drs. Pradip Rao, John Gleaves, and William Jones

PEER REVIEW BY: Drs. James Lyons, Umit Ozkan, and Prof. Israel Wachs

### **Advanced Catalyst Design**

AUTHORS: Drs. Bruce Gates, Avelino Corma, Amir Hoveyda and John Newsam

PEER REVIEW BY: Dr. George Marcelin, Profs. Alexis Bell and William Goddard III

### **New Analytical Tools for Catalyst Characterization**

AUTHORS: Drs. James Haw, William Moser, and George Metzner

PEER REVIEW BY: Dr. James Mooney and Prof. Kamil Klier

### **Zeolite Advances in Petroleum and Organic Chemicals II**

AUTHORS: Drs. Avelino Corma, Wolfgang Holderich, John Horsley and Geoffrey Dolbear

PEER REVIEW BY: Drs. Sigmund Csicsery, Howard Sherry, and John Ward



**1997**

**Methane Conversion**

**New Developments in Base Metal Catalysts**

**Macroporous Catalytic Materials and Ultra-Large Pore Zeolites**

**Advances in Chemical and Refining Separations Technology**

**1996**

**New Developments in Selective Oxidation Catalysis**

**Solid Acid and Superacid Catalysis**

**Developments in Catalyst Support Technology**

**Advances in Selective Hydrogenation Catalysis Volume I**

**1995**

**Zeolite Advances in Petroleum and Organic Chemicals**

**Advances in Catalyst Preparation**

**Hybrid Catalysis in Polyolefins and Copolymers**

**New Catalysis for Aqueous Chemical and Refining Process Waste**



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