

nanoGe Fall Meeting19 (NGFM19)

#SolCat19. (Photo)electrocatalysis for sustainable carbon utilization: mechanisms, methods, and reactor development

Berlin, Germany, 2019 November 6th - 8th

Conference Chairs: Matthew Mayer and Ludmilla Steier

Conference Program

November 6th - Day 4 (Wednesday)	
	Plenary Session Chair: Jacky Even Room: Plenum / Breakout 4
09:00 - 09:30	<u>Jenny Zhang</u> (<i>Department of Chemistry, University of Cambridge - UK</i>)
Session-K1	Semi-artificial Photosynthesis: a Platform for Studying and Wiring Photosynthesis
09:00 - 09:30	<u>David Mitzi</u> (<i>Duke University</i>)
Session-K2	Organic-Inorganic Perovskites: Unrivalled Versatility for Semiconductor Design and Fabrication
	SolCat 1.1 Chair: Ludmilla Steier Room: Breakout 3
09:30 - 10:00	<u>Csaba Janáky</u> (<i>University of Szeged</i>), Balázs Endrődi, Dorottya Hursán, Egon Kecsenvity, Richard Jones
1.1-O1	Scaling-up Carbon-dioxide Electroreduction: from Novel Catalysts to Electrolyzer Development
10:00 - 10:30	<u>Jan Rossmeisl</u> (<i>Department of Chemistry, Nano-Science Center, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen, Denmark</i>)
1.1-I1	Electrocatalysis at the Atomic Scale
10:30 - 11:00	Coffee Break
	SolCat 1.2
11:00 - 11:30	<u>Yogesh Surendranath</u> (<i>Massachusetts Institute of Technology - USA</i>)
1.2-I1	Mechanistic Insights Into Selective CO ₂ -to-Fuels Catalysis
11:30 - 11:45	<u>Stefano Mezzavilla</u> (<i>Department of Materials, Imperial College London, United Kingdom</i>), Sebastian Horch, Ifan Stephens, Brian Seger, Ib Chorkendorff
1.2-O1	Active Sites for the Electrochemical Reduction of CO ₂ on Gold Surfaces – a Structure-Sensitivity Study
11:45 - 12:00	<u>Wen Ju</u> (<i>Technische Universität Berlin</i>), Alexander Bagger, Frederic Jaouen, Jan Rossmeisl, Peter Strasser
1.2-O2	Mechanistic understanding of formaldehyde reduction on metals and M-N-C catalysts
12:00 - 13:30	Lunch
	SolCat 1.3 Room: Breakout 3
13:30 - 13:45	<u>Paula Sebastian Pascual</u> (<i>Department of Chemistry, Nano-Science Center, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen, Denmark</i>), Alexander Bagger, Jan Rossmeisl, Maria Escudero-Escribano
1.3-O1	Surface Sensitivity and Electrolyte Effects on Cu Single-crystalline Electrodes for CO Electroreduction
13:45 - 14:00	<u>Kailun Yang</u> (<i>Delft University of Technology (TU Delft)</i>), Recep Kas, Wilson Smith
1.3-O2	Existence of Persistent High Local pH during Electrochemical CO ₂ Reduction in Densely Buffered Neutral Medium
14:00 - 14:30	<u>Brian Seger</u> (<i>Technical University of Denmark (DTU)</i>), Gaston Larrazabal, Ming Ma, Ib Chorkendorff, Kasper Therkildsen
1.3-O3	Analyzing the Complete Carbon Balance in High Current Density Electrochemical CO ₂ Reduction Reactors

14:30 - 15:00	Beatriz Roldan Cuenya (<i>Department of Interface Science, Fritz-Haber-Institute of the Max Planck Society, 14195 Berlin Germany</i>)
1.3-I1	Size, Shape, Composition and Electrolyte Effect in CO ₂ electroreduction
15:00 - 15:30	Paul Kenis (<i>University of Illinois at Urbana-Champaign</i>)
1.3-I2	Co-Electrolysis for Efficient Electroreduction of CO ₂ to Intermediates Fuels or Chemicals
15:30 - 16:00	Coffee Break
	SolCat 1.4 Chair: Matthew Mayer Room: Breakout 3
16:00 - 16:15	Shahid Rasul (<i>Northumbria University</i>), Eileen Yu
1.4-O3	Recycling CO ₂ to Produce Renewable Fuels
16:15 - 16:30	Giorgio Giuffredi, Federica Arena, Hilmar Guzman, Cesare Cosentino, Simelys Hernandez, Fabio Di Fonzo
1.4-O4	(<i>Center for Nano Science and Technology @PoliMi, Istituto Italiano di Tecnologia</i>) Hierarchical, Quasi-1D CuOx-derived Nanostructured Copper Catalysts for CO ₂ Reduction
16:30 - 16:45	Seyedehbehnaz Varandili (<i>Laboratory of Nanochemistry for Energy, EPFL, Switzerland</i>)
1.4-O1	Interfacial Synergy in Cu/metal oxide Nanocrystalline Heterodimers for Enhanced CO ₂ Electroreduction
16:45 - 17:00	Pranit Iyengar (<i>Laboratory of Nanochemistry for Energy, EPFL, Switzerland</i>), Gian Luca De Gregorio, Raffaella Buonsanti
1.4-O2	Facet Dependent Reactivity of Copper Nanocrystals for Electrochemical CO ₂ Reduction to Valuable Products
November 7th - Day 5 (Thursday)	
	SolCat 2.1 Room: Breakout 3
09:00 - 09:30	Erwin Reisner (<i>University of Cambridge - UK</i>)
2.1-I1	Solar-driven Utilization of CO ₂ with Molecularly-Engineered Semiconductor Hybrid Systems
09:30 - 09:45	Ravi Shankar (<i>Barrer Centre, Department of Chemical Engineering, Imperial College London United Kingdom</i>), Michael Sachs, Laia Francàs, Daphné Lubert-Perquel, Gwilherm Kerherve, Anna Regoutz, Camille Petit
2.1-O1	Porous Boron Oxynitride for Combined CO ₂ Capture and Photoreduction
09:45 - 10:00	Matthias May (<i>Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Institute for Solar Fuels, Germany</i>), Kira Rehfeld
2.1-O2	Beyond Solar Fuels: Photoelectrochemical Approaches to Negative Emissions
10:00 - 10:30	Elena Mas-Marzá (<i>1 Institute of Advanced Materials (INAM), Universitat Jaume I, Castellon, 12006 (Spain)</i>), Ramón Arcas-Martínez, Laxman Gouda, Francisco Fabregat-Santiago
2.1-O3	Photoelectrosynthesis of Imines
10:30 - 11:00	Coffee Break
	SolCat 2.2 Room: Breakout 3
11:00 - 11:30	Joel Ager (<i>University of California at Berkeley and Lawrence Berkeley National Laboratory</i>)
2.2-I1	Cascade Catalysis Controls Selectivity in Electrochemical Carbon Dioxide Reduction
11:30 - 12:00	Laura C Pardo-Perez, Detre Teschner, Elena Willinger, Anna Fischer (<i>Institute for Inorganic and Analytical Chemistry, Inorganic Functional Materials Lab, University of Freiburg, Germany</i>)
2.2-O1	SnIn@InSnOx core@shell Nanoparticles as Electrocatalysts for CO ₂ Electroreduction to Formate
12:00 - 13:30	Lunch
	SolCat 2.3 Room: Breakout 3
13:30 - 14:00	Peter Strasser (<i>Dept. of Chemistry, Technical University Berlin, Strasse des 17. Juni 124, TC 03, 10623 Berlin, Germany</i>)
2.3-I1	Mechanistic Studies of the Electrochemical CO ₂ Reduction on Single Site, Metallic and Hybrid Electrocatalysts

14:00 - 14:30	Karen Chan (<i>Technical University of Denmark (DTU)</i>)
2.3-I2	The Effect of the Electrolyte on Electrochemical CO ₂ Reduction
14:30 - 14:45	
14:45 - 15:15	Juan J. Velasco Vélez (<i>Fritz Haber Institute of the Max Planck Society</i>), Cheng-Hao Chuang, Dunfeng Gao,
2.3-O2	Qingjun Zhu, Travis Jones, Emilia Carbonio, Peter Strasser, Beatriz Roldán-Cuenya, Robert Schlögl, Axel Knop-Gericke
	In situ X-ray Spectroscopy Investigation of the Cathodic Electroreduction of CO ₂ into Valuable Chemical Feedstocks onto Copper Based Catalysts
15:15 - 15:30	Andreas Wagner (<i>Christian Doppler Laboratory for Sustainable SynGas Chemistry, Department of Chemistry, University of Cambridge</i>), Khoa Ly, Nina Heidary, István Szabó, Tamás Földes, Khaleel Assaf, Steven Barrow,
2.3-O1	Kamil Sokołowski, Nikolay Kornienko, Moritz Kuehnelt, Edina Rosta, Ingo Zebger, Werner Nau, Oren Scherman, Erwin Reisner
	Host-guest Chemistry Meets Electrocatalysis: Cucurbit[6]uril on a Au Surface as Hybrid System in CO ₂ Reduction
15:30 - 16:00	Coffee Break
	SolCat 2.4 Room: Breakout 3
16:00 - 16:30	Idan Hod (<i>Department of Chemistry, Ben-Gurion University of the Negev</i>), Ran Shimoni, Itamar Liberman, Raya
2.4-O1	Ifraemov, Wenhui He, Chanderpratap Singh
	Metal-Organic Frameworks as a Heterogeneous Platform for (Photo)-Electrocatalytic CO ₂ Reduction
16:30 - 16:45	Yannick T. Guntern (<i>Laboratory of Nanochemistry for Energy, EPFL, Switzerland</i>), James R. Pankhurst,
2.4-O2	Raffaella Buonsanti
	Nanocrystal/Metal-Organic Framework Hybrids as Electrocatalytic Platform for CO ₂ Conversion
16:45 - 17:00	Federica Arena (<i>National Center for Nanoscience and Technology</i>), Giorgio Giuffredi, Stefano Donini, Emilio
2.4-O3	Parisini, Fabio Di Fonzo
	Bioelectrochemical TiN FDH Catalyst for CO ₂ Reduction to HCOOH
17:00 - 19:00	Poster Session
November 8th - Day 6 (Friday)	
	Plenary Session Room: Plenum / Breakout 4
09:00 - 09:30	Dmitri Talapin (<i>Department of Chemistry, University of Chicago, Chicago, Illinois 60637, USA</i>)
Session-K1	Self-organization of Electrostatically and Sterically Stabilized Colloidal Nanocrystals: The Roles of Topology, Image Charges and Non-classical Nucleation
09:00 - 09:30	Xiaoyang Zhu (<i>Department of Chemistry, Columbia University, New York, New York 10027, United States</i>)
Session-K2	Ferroelectric Polarons in Lead Halide Perovskites
	SolCat 3.1 Room: Breakout 3
09:30 - 10:00	Todd Deutsch (<i>Chemistry and Nanoscience Center, National Renewable Energy Laboratory</i>), Yingying Chen,
3.1-O1	Ashlee Vise, Walter Klein, Guido Bender, KC Neyerlin
	Electrocatalytic Reduction of Carbon Dioxide at a Triple Phase Boundary in Flow Reactors
10:00 - 10:30	Sophia Haussener (<i>Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland</i>)
3.1-I1	Transport Effects on CO ₂ Reduction Selectivity and Activity in Mesoporous Electrodes
10:30 - 11:00	Coffee Break
	SolCat 3.2 Room: Breakout 3
11:00 - 11:30	Matthew Kanan (<i>Chemistry, Stanford University</i>)
3.2-I1	Structure–Activity Relationships and Gas Diffusion Cell Engineering for CO ₂ and CO Electrolysis

11:30 - 11:45	<u>Wenbo Ju</u> (<i>Empa, Swiss Federal Laboratories for Materials Science and Technology</i>), Corsin Battaglia
3.2-O1	Electrocatalytic Reduction of Gaseous CO ₂ to CO on Sn/Cu-Nanofiber-Based Gas Diffusion Electrodes
11:45 - 12:00	<u>Tim Möller</u> (<i>The Electrochemical Energy, Catalysis, and Materials Science Laboratory, Department of Chemistry, Chemical Engineering Division, Technical University Berlin, Berlin, Germany</i>), Trung Ngo Thanh, Zarko Jovanov, Peter Strasser
3.2-O2	Electrochemical Conversion of CO ₂ into Hydrocarbons at Industrial Current Densities on Shaped Copper-oxide Gas Diffusion Electrodes
12:00 - 12:15	<u>Xingli Wang</u> (<i>Technical University of Berlin</i>), Tim Möller, Henrike Schmies, Jorge Ferreira de Araújo, Peter Strasser
3.2-O3	2-Dimensional Copper Oxides with Stable and Selective Ethylene Production for Direct CO ₂ Electroreduction from H-cell to Flow Cell
12:15 - 12:30	<u>Kai Liu</u> (<i>Delft University of Technology, Department of Chemical Engineering, Materials for Energy Conversion and Storage</i>), Nathan Nesbitt, Thomas Burdyny, Wilson Smith
3.2-O4	How Local Reaction and Process Conditions Influence CO ₂ Reduction to Multicarbon Products on Copper Gas-Diffusion electrodes
12:30 - 14:00	Lunch
SolCat 3.3 Room: Breakout 3	
14:00 - 14:30	<u>Ifan Stephens</u> (<i>Department of Materials, Imperial College London, United Kingdom</i>)
3.3-I1	Pathways to energy dense fuels via CO ₂ electroreduction on Cu surfaces
14:30 - 15:00	<u>Víctor A. de la Peña O'Shea</u> (<i>1 Photoactivated Proceses Unit IMDEA Energy Institute</i>)
3.3-I2	Multifunctional Materials for Solar Fuels Production by Artificial Photosynthesis
15:00 - 15:30	<u>Thomas Burdyny</u> (<i>Delft University of Technology (TU Delft)</i>), Wilson Smith
3.3-O1	Making Fuel Out of Thin Air: Visualizing an Endgame for CO ₂ Electrolyzers
15:30 - 16:00	Coffee Break
16:00 - 17:00	SolCat 3.4

Poster Contribution

241	<u>Nihal Guenani</u> (<i>Institute of Advanced Materials (INAM), Universitat Jaume I</i>), Antonio Guerrero, Mariam Barawi, Ignacio J. Villar-García, Victor A. de la Peña O'Shea Ni-Ti Porous Electrodes for Electrochemical Applications
307	<u>Simelys Hernández</u> (<i>Department of applied science and technology (DISAT), Politecnico di Torino, C.so Duca degli Abruzzi, 24, 10129, Turin, Italy</i>), M.Amin Farkhondehfal, Matteo Rattalino, Michiel Makkee, Andrea Lamberti, Angelica Chiodoni, Katarzyna Bejtka, Adriano Sacco, Fabrizio Pirri, Nunzio Russo Syngas production by electrocatalytic reduction of CO ₂ by using Ag-decorated TiO ₂ nanotubes
336	<u>Inês Jordão Pereira</u> (<i>Department of Chemistry, Nano-Science Center, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen, Denmark</i>), Kim Degn Jensen, María Escudero Escribano Electrocatalytic reactions on Pd atomic ensembles
352	<u>Liel Abisdreis</u> (<i>Department of Chemistry, Ben Gurion University, Beer sheva, Israel</i>), Michael Volokh, Menny Shalom Formation of Carbon Nitride Films Using Electrophoretic Deposition of Supramolecular Assemblies for Enhanced Photoelectrochemical Cell Performance
361	<u>Jugin Zeng</u> (<i>Center for Sustainable Future Technologies, IIT@Polito, Istituto Italiano di Tecnologia, Via Livorno, 60, 10144, Turin, Italy.</i>), Katarzyna Bejtka, Adriano Sacco, Micaela Castellino, Candido Fabrizio Pirri, Angelica Chiodoni Copper-Based Electrodes for Electrochemical CO ₂ Conversion
369	<u>Shan Jiang</u> (<i>Fachbereich Physik, Freie Universität Berlin, Arnimallee 14, 14195 Berlin, Germany</i>), Katharina Klingan, Chiara Pasquini, Luca D'Amario, Holger Dau New aspects of operando Raman spectroscopy applied to electrochemical CO ₂ reduction on Cu foams
374	<u>Roser Fernández-Climent</u> (<i>1 Institute of Advanced Materials (INAM), Universitat Jaume I, Castellon, 12006 (Spain)</i>), Miguel García-Tecedor, Sixto Gimenez Study of Copper-Derived Catalysts for Electrochemical Reduction of CO ₂
380	<u>Laia Castilla-Amorós</u> (<i>Laboratory of Nanochemistry for Energy, EPFL, Switzerland</i>), Jianfeng Huang, Raffaella Buonsanti Colloidal Multimetallic Nanoparticles to Advance Electrochemical CO ₂ Conversion Studies
381	<u>Tomoko Yoshida</u> (<i>Advanced Research Institute for Natural Science and Technology, Osaka City University</i>), Muneaki Yamamoto, Akiyo Ozawa, Tetsuo Tanabe Characterization of nitrogen implanted TiO ₂ photocatalysts by soft X-ray spectroscopy
383	Laura Pardo-Pérez, Sasho Stojkovikj, Alexander Arndt, Lifei Xi, <u>Matthew T. Mayer</u> (<i>Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Young Investigator Group: Electrochemical Conversion of CO₂</i>) Investigating synergetic effects in Cu-Sn mixed metal oxide CO ₂ reduction electrocatalysts by hard and soft X-ray spectroscopy