

nanoGe Fall Meeting19 (NGFM19)

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

Berlin, Germany, 2019 November 5th - 8th

Conference Chairs: Matthew Mayer and Ludmilla Steier

Conference Program

November 5th - Day 3 (Tuesday)	
17:00 - 19:00	Poster Session
November 6th - Day 4 (Wednesday)	
	SolCat 1.1 Chair: Ludmilla Steier
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 Chair: Ludmilla Steier
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 - 12:15	<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
1.2-O3	Surface Sensitivity and Electrolyte Effects on Cu Single-crystalline Electrodes for CO Electroreduction
12:15 - 12:30	<u>Kailun Yang</u> (<i>Delft University of Technology (TU Delft)</i>), Recep Kas, Wilson Smith
1.2-O4	Existence of Persistent High Local pH during Electrochemical CO ₂ Reduction in Densely Buffered Neutral Medium
12:30 - 14:00	Lunch
	SolCat 1.3 Chair: Matthew Mayer
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-O1	Analyzing the Complete Carbon Balance in High Current Density Electrochemical CO ₂ Reduction Reactors
14:30 - 15:00	<u>Beatriz Roldan Cuenya</u> (<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	<u>Paul Kenis</u> (<i>University of Illinois at Urbana-Champaign</i>)
1.3-I2	Co-Electrolysis for Efficient Electroreduction of CO ₂ to Intermediates Fuels or Chemicals
SolCat 1.4 Chair: Matthew Mayer	
16:00 - 16:15	<u>Shahid Rasul</u> (<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, <u>Fabio Di Fonzo</u>
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	<u>Seyedehbehnaz Varandili</u> (<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	<u>Pranit Iyengar</u> (<i>Laboratory of Nanochemistry for Energy, EPFL, Switzerland</i>), Gian Luca De Gregorio, Raffaella
1.4-O2	Buonsanti Facet Dependent Reactivity of Copper Nanocrystals for Electrochemical CO ₂ Reduction to Valuable Products
November 7th - Day 5 (Thursday)	
SolCat 2.1	
09:00 - 09:30	<u>Erwin Reisner</u> (<i>University of Cambridge</i>)
2.1-I1	Solar-driven Utilization of CO ₂ with Molecularly-Engineered Semiconductor Hybrid Systems
09:30 - 09:45	<u>Ravi Shankar</u> (<i>Barrer Centre, Department of Chemical Engineering, Imperial College London United Kingdom</i>),
2.1-O1	Michael Sachs, Laia Francàs, Daphné Lubert-Perquel, Gwilherm Kerherve, Anna Regoutz, Camille Petit Porous Boron Oxynitride for Combined CO ₂ Capture and Photoreduction
09:45 - 10:00	<u>Matthias May</u> (<i>Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Institute for Solar Fuels, Germany</i>),
2.1-O2	Kira Rehfeld Beyond Solar Fuels: Photoelectrochemical Approaches to Negative Emissions
10:00 - 10:30	<u>Elena Mas-Marzá</u> (<i>1 Institute of Advanced Materials (INAM), Universitat Jaume I, Castellon, 12006 (Spain)</i>),
2.1-O3	Ramón Arcas-Martínez, Laxman Gouda, Francisco Fabregat-Santiago Photoelectrosynthesis of Imines
10:30 - 11:00	Coffee Break
SolCat 2.2	
11:00 - 11:30	<u>Joel Ager</u> (<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, <u>Anna Fischer</u> (<i>Institute for Inorganic and Analytical</i>
2.2-O1	<i>Chemistry, Inorganic Functional Materials Lab, University of Freiburg, Germany</i>) SnIn@InSnOx core@shell Nanoparticles as Electrocatalysts for CO ₂ Electroreduction to Formate
12:00 - 12:30	<u>Peter Strasser</u> (<i>Dept. of Chemistry, Technical University Berlin, Strasse des 17. Juni 124, TC 03, 10623 Berlin,</i>
2.2-I2	<i>Germany</i>) Mechanistic Studies of the Electrochemical CO ₂ Reduction on Single Site, Metallic and Hybrid Electrocatalysts
12:30 - 14:00	Lunch
SolCat 2.3	
14:00 - 14:30	<u>Karen Chan</u> (<i>Technical University of Denmark (DTU)</i>)
2.3-I1	The Effect of the Electrolyte on Electrochemical CO ₂ Reduction
14:30 - 14:45	<u>Khoa Hoang Ly</u> (<i>Fakultät für Chemie und Lebensmittelchemie, Technische Universität Dresden</i>)
2.3-O1	Operando Vibrational Spectroelectrochemistry for Studying CO ₂ Reduction Catalysis Promoted by Molecularly-defined Electrocatalysts

14:45 - 15:15 2.3-O2	<u>Juan J. Velasco Vélez</u> (<i>Fritz Haber Institute of the Max Planck Society</i>), Cheng-Hao Chuang, Dunfeng Gao, 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 CO₂ into Valuable Chemical Feedstocks onto Copper Based Catalysts
15:15 - 15:30 2.3-O3	<u>Andreas Wagner</u> (<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, Kamil Sokołowski, Nikolay Kornienko, Moritz Kuehnell, Edina Rosta, Ingo Zebger, Werner Nau, Oren Scherman, Erwin Reisner 1 Host-guest Chemistry Meets Electrocatalysis: Cucurbit[6]uril on a Au Surface as Hybrid System in CO₂ Reduction
15:30 - 16:00	Coffee Break
	SolCat 2.4
16:00 - 16:30 2.4-O1	<u>Idan Hod</u> (<i>Department of Chemistry, Ben-Gurion University of the Negev</i>), Ran Shimoni, Itamar Liberman, Raya Ifraemov, Wenhui He, Chanderpratap Singh Metal-Organic Frameworks as a Heterogeneous Platform for (Photo)-Electrocatalytic CO₂ Reduction
16:30 - 16:45 2.4-O2	<u>Yannick T. Guntern</u> (<i>Laboratory of Nanochemistry for Energy, EPFL, Switzerland</i>), James R. Pankhurst, Raffaella Buonsanti Nanocrystal/Metal-Organic Framework Hybrids as Electrocatalytic Platform for CO₂ Conversion
16:45 - 17:00 2.4-O3	<u>Federica Arena</u> (<i>National Center for Nanoscience and Technology</i>), Giorgio Giuffredi, Stefano Donini, Emilio Parisini, Fabio Di Fonzo Bioelectrochemical TiN FDH Catalyst for CO₂ Reduction to HCOOH
17:00 - 19:00	Poster Session
November 8th - Day 6 (Friday)	
	Plenary Session Chair: Paulina Plochocka
09:00 - 09:30 Session-K1	<u>Dmitri Talapin</u> (<i>Department of Chemistry, University of Chicago, Chicago, Illinois 60637, USA</i>) Self-organization of Electrostatically and Sterically Stabilized Colloidal Nanocrystals: The Roles of Topology, Image Charges and Non-classical Nucleation
09:00 - 09:30 Session-K2	<u>Xiaoyang Zhu</u> (<i>Department of Chemistry, Columbia University, New York, New York 10027, United States</i>) Ferroelectric Polarons in Lead Halide Perovskites
	SolCat 3.1
09:30 - 10:00 3.1-O1	<u>Todd Deutsch</u> (<i>Chemistry and Nanoscience Center, National Renewable Energy Laboratory</i>), Yingying Chen, 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 3.1-I1	<u>Sophia Haussener</u> (<i>Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland</i>) Transport Effects on CO₂ Reduction Selectivity and Activity in Mesoporous Electrodes
10:30 - 11:00	Coffee Break
	SolCat 3.2
11:00 - 11:30 3.2-I1	<u>Matthew Kanan</u> (<i>Chemistry, Stanford University</i>) Structure–Activity Relationships and Gas Diffusion Cell Engineering for CO₂ and CO Electrolysis
11:30 - 11:45 3.2-O1	<u>Wenbo Ju</u> (<i>Empa, Swiss Federal Laboratories for Materials Science and Technology</i>), Corsin Battaglia Electrocatalytic Reduction of Gaseous CO₂ to CO on Sn/Cu-Nanofiber-Based Gas Diffusion Electrodes

11:45 - 12:00 3.2-O2	<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 Electrochemical Conversion of CO ₂ into Hydrocarbons at Industrial Current Densities on Shaped Copper-oxide Gas Diffusion Electrodes
12:00 - 12:15 3.2-O3	<u>Xingli Wang</u> (<i>Technical University of Berlin</i>), Tim Möller, Henrike Schmies, Jorge Ferreira de Araújo, Peter Strasser 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 3.2-O4	<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 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
14:00 - 14:30 3.3-I1	<u>Ifan Stephens</u> (<i>Department of Materials, Imperial College London, United Kingdom</i>) Pathways to energy dense fuels via CO ₂ electroreduction on Cu surfaces
14:30 - 15:00 3.3-I2	<u>Víctor A. de la Peña O'Shea</u> (<i>1 Photoactivated Proceses Unit IMDEA Energy Institute</i>) Multifunctional Materials for Solar Fuels Production by Artificial Photosynthesis
15:00 - 15:30 3.3-O1	<u>Thomas Burdyny</u> (<i>Delft University of Technology (TU Delft)</i>), Wilson Smith 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