

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)	
	SolCat 1.1
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 - 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
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
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	(Center for Nano Science and Technology @PoliMi, Istituto Italiano di Tecnologia) Hierarchical, Quasi-1D CuOx-derived Nanostructured Copper Catalysts for CO2 Reduction
16:30 - 16:45	<u>Seyedehbehnaz Varandili</u> (Laboratory of Nanochemistry for Energy, EPFL, Switzerland)
1.4-O1	Interfacial Synergy in Cu/metal oxide Nanocrystalline Heterodimers for Enhanced CO2 Electroreduction
16:45 - 17:00	<u>Pranit Iyengar</u> (Laboratory of Nanochemistry for Energy, EPFL, Switzerland), Gian Luca De Gregorio, Raffaella Buonsanti
1.4-O2	Facet Dependent Reactivity of Copper Nanocrystals for Electrochemical CO2 Reduction to Valuable Products

November 7th - Day 5 (Thursday)

SolCat 2.1	
09:00 - 09:30	<u>Erwin Reisner</u> (University of Cambridge - UK)
2.1-I1	Solar-driven Utilization of CO2 with Molecularly-Engineered Semiconductor Hybrid Systems
09:30 - 09:45	<u>Ravi Shankar</u> (Barrer Centre, Department of Chemical Engineering, Imperial College London United Kingdom), Michael Sachs, Laia Francàs, Daphné Lubert-Perquel, Gwilherm Kerherve, Anna Regoutz, Camille Petit
2.1-O1	Porous Boron Oxynitride for Combined CO2 Capture and Photoreduction
09:45 - 10:00	<u>Matthias May</u> (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Institute for Solar Fuels, Germany), Kira Rehfeld
2.1-O2	Beyond Solar Fuels: Photoelectrochemical Approaches to Negative Emissions
10:00 - 10:30	<u>Elena Mas-Marzá</u> (1 Institute of Advanced Materials (INAM), Universitat Jaume I, Castellon, 12006 (Spain)), Ramón Arcas-Martínez, Laxman Gouda, Francisco Fabregat-Santiago
2.1-O3	Photoelectrosynthesis of Imines
10:30 - 11:00	Coffee Break
SolCat 2.2	
11:00 - 11:30	<u>Joel Ager</u> (University of California at Berkeley and Lawrence Berkeley National Laboratory)
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> (Institute for Inorganic and Analytical Chemistry, Inorganic Functional Materials Lab, University of Freiburg, Germany)
2.2-O1	SnIn@InSnOx core@shell Nanoparticles as Electrocatalysts for CO2 Electroreduction to Formate
12:00 - 12:30	<u>Peter Strasser</u> (Dept. of Chemistry, Technical University Berlin, Strasse des 17. Juni 124, TC 03, 10623 Berlin, Germany)
2.2-I2	Mechanistic Studies of the Electrochemical CO2 Reduction on Single Site, Metallic and Hybrid Electrocatalysts
12:30 - 14:00	Lunch
SolCat 2.3	
14:00 - 14:30	<u>Karen Chan</u> (Technical University of Denmark (DTU))
2.3-I1	The Effect of the Electrolyte on Electrochemical CO2 Reduction
14:30 - 14:45	<u>Khoa Hoang Ly</u> (Fakultät für Chemie und Lebensmittelchemie, Technische Universität Dresden)
2.3-O1	Operando Vibrational Spectroelectrochemistry for Studying CO2 Reduction Catalysis Promoted by Molecularly-defined Electrocatalysts
14:45 - 15:15	<u>Juan J. Velasco Vélez</u> (Fritz Haber Institute of the Max Planck Society), Cheng-Hao Chuang, Dunfeng Gao, Qingjun Zhu, Travis Jones, Emilia Carbonio, Peter Strasser, Beatriz Roldán-Cuenya, Robert Schlögl, Axel Knop-Gericke
2.3-O2	In situ X-ray Spectroscopy Investigation of the Cathodic Electroreduction of CO2 into Valuable Chemical Feedstocks onto Copper Based Catalysts

15:15 - 15:30 **Andreas Wagner** (*Christian Doppler Laboratory for Sustainable SynGas Chemistry, Department of Chemistry, University of Cambridge*), Khoa Ly, Nina Heidary, István Szabó, Tamás Földes, Khaleel Assaf, Steven Barrow, Kamil Sokołowski, Nikolay Kornienko, Moritz Kuehnelt, Edina Rosta, Ingo Zebger, Werner Nau, Oren Scherman, Erwin Reisner
 2.3-O3
 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 **Idan Hod** (*Department of Chemistry, Ben-Gurion University of the Negev*), Ran Shimoni, Itamar Liberman, Raya Ifraemov, Wenhui He, Chanderpratap Singh
 2.4-O1
 Metal-Organic Frameworks as a Heterogeneous Platform for (Photo)-Electrocatalytic CO₂ Reduction

16:30 - 16:45 **Yannick T. Guntern** (*Laboratory of Nanochemistry for Energy, EPFL, Switzerland*), James R. Pankhurst, Raffaella Buonsanti
 2.4-O2
 Nanocrystal/Metal-Organic Framework Hybrids as Electrocatalytic Platform for CO₂ Conversion

16:45 - 17:00 **Federica Arena** (*National Center for Nanoscience and Technology*), Giorgio Giuffredi, Stefano Donini, Emilio Parisini, Fabio Di Fonzo
 2.4-O3
 Bioelectrochemical TiN|FDH Catalyst for CO₂ Reduction to HCOOH

17:00 - 19:00 **Poster Session**

November 8th - Day 6 (Friday)

Plenary Session

09:00 - 09:30 **Dmitri Talapin** (*Department of Chemistry, University of Chicago, Chicago, Illinois 60637, USA*)
 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** (*Department of Chemistry, Columbia University, New York, New York 10027, United States*)
 Session-K2
 Ferroelectric Polarons in Lead Halide Perovskites

SolCat 3.1

09:30 - 10:00 **Todd Deutsch** (*Chemistry and Nanoscience Center, National Renewable Energy Laboratory*), Yingying Chen, Ashlee Vise, Walter Klein, Guido Bender, KC Neyerlin
 3.1-O1
 Electrocatalytic Reduction of Carbon Dioxide at a Triple Phase Boundary in Flow Reactors

10:00 - 10:30 **Sophia Haussener** (*Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland*)
 3.1-I1
 Transport Effects on CO₂ Reduction Selectivity and Activity in Mesoporous Electrodes

10:30 - 11:00 **Coffee Break**

SolCat 3.2

11:00 - 11:30 **Matthew Kanan** (*Chemistry, Stanford University*)
 3.2-I1
 Structure–Activity Relationships and Gas Diffusion Cell Engineering for CO₂ and CO Electrolysis

11:30 - 11:45 **Wenbo Ju** (*Empa, Swiss Federal Laboratories for Materials Science and Technology*), Corsin Battaglia
 3.2-O1
 Electrocatalytic Reduction of Gaseous CO₂ to CO on Sn/Cu-Nanofiber-Based Gas Diffusion Electrodes

11:45 - 12:00 **Tim Möller** (*The Electrochemical Energy, Catalysis, and Materials Science Laboratory, Department of Chemistry, Chemical Engineering Division, Technical University Berlin, Berlin, Germany*), Trung Ngo Thanh, Zarko Jovanov, Peter Strasser
 3.2-O2
 Electrochemical Conversion of CO₂ into Hydrocarbons at Industrial Current Densities on Shaped Copper-oxide Gas Diffusion Electrodes

12:00 - 12:15 **Xingli Wang** (*Technical University of Berlin*), 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 CO₂ 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, Víctor 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 Bejtko, Adriano Sacco, Fabrizio Pirri, Nunzio Russo Syngas production by electrocatalytic reduction of CO ₂ by using Ag-decorated TiO ₂ nanotubes