

# **232nd ECS Meeting 2017**

Meeting Abstracts 2017-02

National Harbor, Maryland, USA  
1 – 5 October 2017

Volume 1 of 6

ISBN: 978-1-5108-4907-5

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**Meeting Abstracts —MA2017-02**

**232nd ECS Meeting**

**October 1, 2017 - October 5, 2017 —National Harbor, MD**

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155Studying Break-in Phenomena in Lithium-Ion Batteries through Acoustic and Impedance Measurements

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649 [Carbonxs GUI – a Graphical Front End for Carbonxs](#)

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656 [Carbon Based Polymer Nanocomposites for Strain Sensor Applications](#)

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657 [\(Invited\) Long Term Intracellular Study of Carbon Nanomaterials at Ultra-Low Concentrations](#)

[Tetyana Ignatova, Sabrina Jedlicka, Slava V. Rotkin](#)

658 [Fluorescently Active Carbon Nanostructures from Neurotransmitter Family Precursors](#)

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659 [Novel Polymer Wrapping of Single-Walled Carbon Nanotube By Radical Polymerization](#)

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660 [Redox Reaction on the Surface/Edge Structures of Graphene/Graphite](#)

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661 [Wet Chemistry for Large Cage Metallofullerene Isolation](#)

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[668Carbon Nanotubes Modified with Fluorine](#)

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[669Influence of Calcination Treatments on the Formation of N-Doped Carbon Nanofibers and Their Electrochemical Properties](#)

Reyna Ojeda-López, Guadalupe Ramos-Sánchez, Juan Marcos Esparza-Schulz, Isaac Jhonatan Pérez-Hermosillo, Armando Domínguez-Ortiz, I. González

670 Transformation of Plant Biomass Waste into Resourceful Activated Carbon Materials for Mixed-Assembly Type Electrochemical Capacitors

Damilola Momodu, Chimaka Okafor, Ncholu Manyala, Abdulhakeem Bello, Martiale Gaetan Zebaze-Kana, Esidor Ntsoenzok

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672 Electrochemical Evaluation of the Influence of Surface Treatment Used on the AA6063T5 Alloy

Dilton Gonçalves Teixeira, Patricia Hatsue Suegama, Cecílio Sadao Fugiwara, Assis Vicente Benedetti

673 Impedance Response of Corrosion Monitoring Sensor Fabricated By Screen-Printing Technique

Naoto Fujii, Akihiro Aiba, Yoshinao Hoshi, Isao Shitanda, Masayuki Itagaki

674 Influences of Chloride and Fluoride Ions on Localized Corrosion of Stainless Steels at Anodic Polarization

Chinatsu Tsukioka, Meiko Ueyama, Yoshinao Hoshi, Isao Shitanda, Masayuki Itagaki, Satoshi Takata, Tomonari Kogure

675 Hydrometallurgical Purification of Metallurgical Grade Silicon with Hydrogen Peroxide in Hydrofluoric Acid

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Olga A Baturina, Matthew James Strom, Farrel J Martin

684 Quantitative Examination of Porous Rust on Steel

Nicholas Curry, Trevor Wills, Simon R Gibbon, Stuart B Lyon

685 Nanostructured Steel Susceptibility to Sulfide Stress Cracking

Arash Shadravan, Raymundo Case, Argie Rumann

686 Iron Sulfides Electroactivity in Environments in the Presence of Strong Acid, Carbonic Acid and Aqueous Hydrogen Sulfide

Saba Navabzadeh Esmaeely, Srdjan Nestic

687 Effect of Residual Chlorine Concentration on Water Pipe Corrosion

Keum Seok Han, Ju-hyun Park, Young-bog Park, Seong Jea Kim, Hyen Don Kim, Young-june Choi, In-cheol Choi, Seong Ho Hong

688 Corrosion Behavior of Non-Vascular, Double-Layer, Surgical Esophageal Nitinol Stent in Phosphate Buffered Saline Solution

Yong-Sang Kim, Jung-Gu Kim

689 Effect of Tail Length of Surfactant-like Corrosion Inhibitors on Chemical Mechanical Planarization Slurry

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690 Examining the GaN Photocorrosion Potential for Stable Chemical Energy Storage

David R Baker

691 Role of Ni Addition in Corrosion Behavior of Model Interface Between Rust Layer and Steel Matrix on Weathering Steels

Yu Sugawara, Waka Inoue, Ayaka Yomogida, Izumi Muto, Shiro Tsuru, Nobuyoshi Hara

692Hydrogen Entry into Steel Exposed in an Outdoor Environment

Saya Kaneko, Eiji Tada, Azusa Ooi, Atsushi Nishikata

693Recent Developments in Mild Steel Corrosion Rate Predictive Models in Sweet Environments

Aria Kahyarian, Srdjan Nestic

694Effect of Cr/Mo on the Protectiveness of Corrosion Scales on Carbon Steel in Sweet Medium Under Hydrodynamic Condition

Mobbassar Hassan Sk, Aboubakr Moustafa Abdullah, Monika Ko, Nick Laycock, Bridget Ingham, Mary P Ryan, David E Williams

695Sulfide Scaling and Corrosion of Carbon Steel in a Sour Medium

Noora Al-Qahtani, Jiahui Qi, Aboubakr Moustafa Abdullah, Nick Laycock, Mary P Ryan

696Effect of Nitrate Ions on Repassivation Behavior of Crevice Corrosion on Type 316L Stainless Steel

Takahito Aoyama, Izumi Muto, Yu Sugawara, Nobuyoshi Hara

697Protection Mechanisms of Inorganic Inhibitors for Localized Corrosion of Stainless Steels at Anodic Polarization

Meiko Ueyama, Chinatsu Tsukioka, Yoshinao Hoshi, Isao Shitanda, Masayuki Itagaki, Satoshi Takata, Tomonari Kogure

698Role of Cerium Ions for Improving Pitting Corrosion Resistance of Sulfide Inclusions in Stainless Steels

Masashi Nishimoto, Izumi Muto, Yu Sugawara, Nobuyoshi Hara

699 Studying Tribocorrosion Mechanisms of Aged 2507 Super Duplex Stainless Steel By Scanning Probe Microscopy

J. Michael Shockley, Christopher R So, Steve A Policastro, Derek J. Horton, Kathryn J. Wahl

700 Atmospheric Corrosion of 904L Austenitic Stainless Steel at Different Environments

Aboubakr Moustafa Abdullah, Mostafa H Sliem, Adel M Mohamed

701 A Study of NiTi Alloy Mechanical and Corrosion Behavior Subjected to Mechanical and Cyclic Thermal Loading in Corrosive Environment

Mahdi Mohajeri, Homero Castaneda, Dimitris Lagoudas

702 Galvanic Corrosion of AA7075-T6 Caused By Doped Titanium Oxides in a Controlled Atmospheric Environment

Steve Policastro, Rachel Anderson, Derek J. Horton, Carlos Hangarter, John A. Keith, Mitchell C. Groenenboom

703 Corrosion and Critical Solute Content of Corrosion-Resistant Binary Solid Solution Cu-Al Alloys in Artificial Perspiration Solution: Implications Towards Tunable Cu-Based Alloys for Antimicrobial Surfaces

Michael John Hutchison, Peng Zhou, Kevin Ogle, John R. Scully

704 Preparation and Characterization of Nanoporous Copper Films By (electro)Chemical Dealloying

Burkhard Hecker, Carsten Dosche, Jonas Knake, Mehtap Oezaslan

705 Dissolution and the Consequent Surface Morphology of Pt-Cu Binary Alloys Under Potential Cycling

Azusa Ooi, Eiji Tada, Atsushi Nishikata

706 Regenerative Electroless Etching of Silicon

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709 [A New Perspective on the Kinetics of Atmospheric Aluminium Pitting Corrosion](#)

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710 [Elucidating the Effects of Oxide Film on Cathodic Limiting Current Density of Aluminum Alloys with Applications to Atmospheric Localized Corrosion](#)

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[Shilpa Kumari, John Charles Walmsley, Otto Lunder, Kemal Nisancioglu](#)

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[718\(Corrosion Division H. H. Uhlig Award Address\) Advanced Experimental and Modelling Approaches to Understand and Predict Better Corrosion of Metals](#)

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[719\(Corrosion Division Morris Cohen Graduate Student Award Address\) Novel Insights into the Corrosion of Magnesium Alloys](#)

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[720\(Invited\) High Strength and Corrosion Resistant Light Alloys Via High-Energy Ball Milling](#)

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[721New Method for Monitoring Hydrogen Evolution of Magnesium Alloys Under Atmospheric Exposure](#)

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[726Experiment-Supported Model Development for Data Treatment of Diffusion and Activation Limited Polarization Curves of Magnesium and Steel Alloys](#)

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[727Alternating Current Phosphoric Acid Etching of Aluminium](#)

[Bruno Burmas, John Erik Lein, Otto Lunder, Kemal Nisancioglu](#)

[728Superhydrophilic and Superhydrophobic Aluminum Alloys Fabricated By Pyrophosphoric Acid Anodizing](#)

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[730 Influence of Major Alloying Elements on the Corrosion Resistance of Trivalent Chromium Conversion Layer Coated AA 2024](#)

[Romain Saillard, Bernard Viguiet, Gregory Odemer, Sandrine Zanna, Antoine Seyeux, Philippe Marcus, Benoît Fori, Christine Blanc](#)

[731 Enhanced Corrosion Performances of Post-Treated Trivalent Chromium Protection \(TCP\) Coating Deposited on Aluminium Alloy 2024-T3](#)

[Jolanta Swiatowska, Anca-Iulia Stoica, Francesco Di Franco, Alexandre Romaine, Sandrine Zanna, Antoine Seyeux, Benoît Fori, Philippe Marcus](#)

[732 Effect of Combination of Anionic Polymer with Calcium Phosphate Coating on Corrosion Behavior of Magnesium Alloy in Physiological Solution](#)

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[Joseph Paul Labukas, Krista R Limmer, John Derek Demaree, B. Chad Hornbuckle, Heather A Murdoch](#)

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[738Effect of Artificial Seawater on Passivation of Ti](#)

[Shaokun Yan, Guang-Ling Song, Dajiang Zheng, Matthew Dargusch, Lian Zhou](#)

[739Development of pH Sensing CFDE to Investigate Anodic Dissolution of Magnesium](#)

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[742Electrochemical Scanning Tunnelling Microscopy Study of Early Stages of Intergranular Corrosion of Copper](#)

[Philippe Marcus, Mohamed Bettayeb, Lorena Klein, Linsey Lapeire, Kim Verbeken, Vincent Maurice](#)

[743Assessment of Galvanic Throwing Power of an Mgrp on Pretreated AA2024-T351: Spatial Mapping of the Galvanic Current Using the Scanning Vibrating Electrode Technique](#)

Carol Frances Glover, Balaji Kannan, Geraint Williams, Hamilton Neil McMurray, John R. Scully

744The Scanning Kelvin Probe As a Non Destructive Evaluation Tool for Monitoring the Degradation of Urethane-Epoxy Coating Systems

Douglas C Hansen, David Borth

745Spatially Resolved Mapping of Hydrogen Permeation with a Novel in-Situ Scanning Kelvin Probe (SKP) Based Setup

Chun-Hung Wu, Waldemar Krieger, Michael Rohwerder

746Stress Generation Accompanying Intergranular Corrosion of X70 Steel

Abdullah Ashehri, Denizhan Yavas, Pratyush Mishra, Pranav Shrotriya, Ashraf Bastawros, Kurt Hebert

747(Olin Palladium Award of the Electrochemical Society Address) Corrosion Mechanisms at the Atomic or Nanometric Scale

Philippe Marcus

748Corrosion and Passivity of a High Entropy Alloy in Sulfate Solutions at Various pH Levels

Kathleen F Quiambao, Angela Yu Gerard, Jayendran Srinivasan, Orion Swanson, Tianshu Li, Pin Lu, James Saal, Gerald S. Frankel, John R. Scully

749Localized Corrosion Behavior of a Ni-Based High-Entropy Alloy

Tianshu Li, Orion Swanson, Pin Lu, Gerald S. Frankel, John R. Scully, James Saal

750Investigation of the Corrosion Electrochemistry of a Ni Based High Entropy Alloy in Chloride Containing Solutions

Angela Yu Gerard, Kathleen F Quiambao, Jayendran Srinivasan, Tianshu Li, James Saal, Pin Lu, Gerald S. Frankel, John R. Scully

[751In Situ Electrochemical-AFM Study of Local Dissolution Processes of Al<sub>x</sub> Co Cr Fe Ni High-Entropy Alloys](#)

[Yunzhu Shi, Liam Collins, Jeremy Come, Nina Balke, Peter Liaw, Bin Yang](#)

[752The Mixed Potential Model for the Passive State and Hydrogen Evolution Reaction of AA2098-T851](#)

[Digby D. Macdonald, Elmira Ghanbari, Alireza Saatchi](#)

[753Localized Corrosion: Passive Film Breakdown Vs. Pit Growth Stability](#)

[Gerald S. Frankel, Tianshu Li, John R. Scully](#)

[754Redefining the Electrochemical Kinetics of Redox Reactions on Passive Metals](#)

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[755\(Invited\) Characterizing Crevice Corrosion Processes Electrochemically, Microscopically, and Spectroscopically](#)

[Nafiseh Ebrahimi, Jamie Noel, Dave Shoesmith](#)

[756The Electrochemistry & Corrosion of Zn-Al-Mg Alloys: Quantifying the Contribution of Elemental Components and Individual Phases with Atomic Emission Spectroelectrochemistry](#)

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[757Depth Profiling of TiO<sub>2</sub> Nanotubes in Morphology, Composition and Structure](#)

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[758Formation Mechanism of Alumina Nanotubes By Anodization of Aluminum Alloy](#)

[Sachiko Ono, Hideki Hashimoto, Hidetaka Asoh](#)

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[Mengyuan Zhang, Yunhan Ling, Siqu Yu, Zhengjun Zhang, Yanhong Gu](#)

[760\(Invited\) In Situ Analytical Methods for Atmospheric Corrosion: Recent Advances and Challenges](#)

[Eric John Schindelholz](#)

[761Connection between Atomic Scale Characterization and Electrochemical Behavior during Passivation of Polycrystalline and Single Crystal Ni-Cr and Ni-Cr-Mo Alloys](#)

[Katie Lutton, Kateryna Gusieva, Gopalakrishnan Ramalingam, William Blades, Xiao-Xiang Yu, Ahmet Gulec, Laurence Marks, Evan Zeitchick, John Perepezko, Noemie Ott, Nick Birbilis, Petra Reinke, John R. Scully](#)

[762Remote Imaging of the Buried Interface Using AFM-IR](#)

[Stuart B Lyon, Suzanne Morsch, Simon R Gibbon](#)

[763EXAFS of Nickel Oxide in the Ionic Liquid Emic/AlCl<sub>3</sub>](#)

[Donald Roeper, Graham T. Cheek, Kaumudi I. Pandya, William E. O'Grady](#)

[764Advanced Characterization of Molten Salts](#)

[Augustus Merwin, Chris Benmore, Mark A. Williamson](#)

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[Michael Rohwerder](#)

[771Capsular Networking and Accelerated Trigger Signal Spreading Velocity in Smart Redox-Responsive Coatings for Corrosion Protection](#)

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[772Cyclodextrins in Corrosion Protection of Zinc](#)

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[773Electro-Codeposited Zinc-Nanocomposite Coatings Tailored for Smart Corrosion Protection](#)

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[774Inhibition of Filiform Corrosion on Organic-Coated Magnesium-Containing Galvanized Steel By Smart-Release Ion Exchange Pigments](#)

[Emmanouela Michailidou, Hamilton Neil McMurray, Geraint Williams](#)



[775 Novel Corrosion Inhibitor Pigments Based on Benzotriazolium Cation Exchanged Resin](#)

[Hamilton Neil McMurray, Calvin Richards, Geraint Williams](#)

[776 Investigation of the “Protection Zone” Phenomenon Established By Conducting Polymers in Coatings for Corrosion Protection](#)

[Anna Merz, Michael Rohwerder](#)

[777 Corrosion Sensors to Monitor the Degradation of Hot-Dip Galvanised Steel and Painted Steel during Accelerated Corrosion Tests](#)

[Dominique Thierry, Frederic Ledan, Erwan Diler, Nathalie Le Bozec](#)

[778 Computational and Experimental Analyses of Galvanic Corrosion of AA7075-T6 Induced By Dissimilar Metal Fasteners and Mitigated By Sol-Gel Coatings](#)

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[780 Novel Polymeric Inhibitor for Corrosion of 57S Aluminium in 2M NaOH Solutions](#)

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[782 Corrosion Inhibition of Mg Alloy AZ31 By Selenite \(SeO<sub>3</sub><sup>2-</sup>\)](#)

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[783Metal-Rich Coating Development for Fracture Mitigation in Al-Mg Alloys](#)

[Matthew E. McMahon, James T. Burns, John R. Scully](#)

[784Novel Ni Based Duplex Coatings for Anticorrosion Applications](#)

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[785Possible Mechanism of Corrosion Inhibition of a High Strength Low Alloy Steel By a Mussel Adhesive Protein](#)

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[786\(Invited\) Anticorrosive Polymer Nanocomposites Coating](#)

[Huige Wei, Jiang Guo, Huayun Du, Qian Shao](#)

[787Superhydrophobic Coatings on Aluminium Based on Carboxylic Acids](#)

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[Hiroshi Yanagimoto, Motoki Hiraoka, Yuki Sato, Hirohumi Iisaka, Jyunya Murai, Masayuki Itagaki, Kensuke Akamatsu](#)

918 [Morphological and Compositional Study of Cu<sub>2</sub>S Grown By Means of E-ALD on Ag\(111\)](#)

[Andrea Giaccherini, Massimo Innocenti, Francesca Russo, Emanuele Salvietti, Enrico Berretti, Maurizio Passaponti, Alessandro Lavacchi, Giordano Montegrossi, Francesco Di Benedetto](#)

919 [Color Measurements and Development in Electroplating Trades](#)

[Walter Giurlani, Stefano Freschi, Antonio De Luca, Andrea Giaccherini, Massimo Innocenti](#)

920 [Mass Transfer Mechanisms in Solid Electro Deposition](#)

[Yuka Narui, Yoshinao Hoshi, Isao Shitanda, Masayuki Itagaki, Hiroshi Yanagimoto, Motoki Hiraoka, Hirofumi Iisaka](#)

921 [Electrodeposition and Characterization of Thin Film of Black-Gold](#)

[Emanuele Piciollo, Claudio Picchi, Alessio Ceccarini, Emanuele Salvietti, Antonio De Luca, Francesco Di Benedetto, Stefano Caporali, Massimo Innocenti](#)

922 [Two-Dimensional Semiconductors Thin Films of MoS<sub>2</sub> and MoSe<sub>2</sub> on Ag\(111\)](#)

[Emanuele Salvietti, Martina Vizza, Andrea Giaccherini, Maurizio Passaponti, Emanuele Piciollo, Francesco Di Benedetto, Massimiliano Cavallini, Massimo Innocenti](#)

923 [In-Situ observation of Cu Electrodeposition and Dissolution Behavior By Video-AFM](#)

[Taiki Yoshioka, Hisayoshi Matsushima, Mikito Ueda](#)

924 [Electrochemical Behavior of Silver Electrodeposition Using Gel Electrolyte](#)

[Haruto Sato, Yoshinao Hoshi, Isao Shitanda, Masayuki Itagaki, Michiko Tagaya](#)

925 [A Novel Electrochemical Method for Analysis of Thin Metal Films and Bilayers for Application in the PCB Industry](#)

[Emma J.R. Palin, Karl Scott Ryder, A Robert Hillman, Emma L. Smith, Virginia Ferreira, Rachel Sapstead, Nina-Juliane Steinke, Robert Barker, Robert Dalgliesh](#)

926 [Additional Approaches to Experimental Validation of the Phenomenon of Electrochemical Phase Formation in Metals Via a Supercooled Liquid State Stage](#)

[Oleg B Girin](#)

927 [Electrodeposition of Manganese Thin Films from Choline Chloride/Urea Based Ionic Liquids](#)

[William D. Sides, Qiang Huang](#)

928 [\(Invited\) Superconformal Film Growth: Impact of Additives and Deposition on Hydrophilicity](#)

[Thomas P. Moffat, Guokun Liu, Shouzhong Zou, Lee Richter, Liang-Yueh Ou Yang, Daniel Wheeler, Daniel Josell](#)

[929 Electrochemical Behavior and Analysis of Organic Additives in Sub 14nm Copper Damascene Plating Baths](#)

[Michael Pavlov, Danni Lin, Eugene Shalyt, Isaak Tsimberg](#)

[930 Microelectrode Studies of the Critical Breakdown and Spatial Bifurcation in Additive Derived S-NDR Copper Electrodeposition](#)

[Trevor M Braun, Thomas P. Moffat](#)

[931 Superconformal Cobalt Fill through the Use of Sacrificial Oxidants](#)

[Matthew Rigsby, Lee Brogan, Natalia Doubina, Tighe Spurlin, Jian Zhou, Jonathan Reid](#)

[932 Superconformal Bottom-up Gold Deposition in High Aspect Ratio through Silicon Vias](#)

[Daniel Josell, Thomas P. Moffat](#)

[933 Electroless Plating of Stacked, Single-Crystalline Silver Nanoplatelets and Dendrites](#)

[Falk Münch, Alexander Vaskevich, Tatyana Bendikov, Ronit Popovitz-Biro, Yishay Feldman, Israel Rubinstein](#)

[934 Study on the Role of Additives in Non-Cyanide Baths for the Fabrication of Anisotropic Metallic Nanostructures](#)

[Kabir Dhingra, Somya Gupta, Jegatha Nambi Krishnan](#)

[935 Tailored Shapes of Fe-Ni-Co Nanowires](#)

[Elizabeth Podlaha, Deyang Li, Xiaohua Geng](#)

[936 Aging Mechanisms in Electrodeposited Cobalt-Hardened Gold Coatings](#)

[Dhego Banga](#)

[937 Au-Pd-Pt Multilayer Catalyst for Miniature Fuel Cells](#)

[Ryo Shirai, Natasa Vasiljevic, Masanori Hayase](#)

[9381D Core-Shell Nanostructures Formed By Electrodeposition of Metals and Metalloids in Anodic TiO<sub>2</sub> Nanotubes](#)

[Damian Kowalski](#)

[939Template Free Photoelectrodeposition of Highly Periodic Three-Dimensional PbSe Nanostructures](#)

[Kathryn R Hamann, Azhar I Carim, Nicolas A. Batara, Jonathan R Thompson, Harry A Atwater, Nathan S Lewis](#)

## **E02-Current Trends in Electrodeposition - An Invited Symposium**

[940\(Electrodeposition Division Research Award Address\) Metal Deposition Assisted by UPD Monolayers-Fundamentals and Applications](#)

[Stanko R Brankovic](#)

[941\(Electrodeposition Division Early Career Investigator Award Address\) Magnetocapacitive Carbon Nanocomposites](#)

[Jiahua Zhu](#)

[942\(Invited\) Electrodeposition in Tailored Nanochannels: A Rich Platform to Study Nanowire Growth in Confinement and to Develop Stable Functional 3D Nanowire Architectures](#)

[Maria Eugenia Toimil-Molares](#)

[943\(Invited\) Electrodeposition for Large Scale Photovoltaic Deployment : A Prospective Trial](#)

[Daniel Lincot, Elisabeth Chassaing, Aurelien Duchatelet, Pierre Philippe Grand](#)

[944\(Invited\) Electrochemical Deposition of Carbon Materials in Molten Salts](#)

[Dihua Wang, Muxing Gao, Zhigang Chen, Bowen Deng, Huayi Yin, Wei Xiao, Xuhui Mao](#)

### **E03-Electrochemical Science and Engineering on the Path from Discovery to Product**

945 [Cost of Renewable Energy](#)

[John Newman](#)

946 [From Designing and Characterizing Multifunctional Nanoarchitectures to Commercializing Zinc Sponge-Based Alkaline Batteries That Refuse to Launch Dendrites](#)

[Debra R. Rolison, Jeffrey W. Long, Joseph F. Parker](#)

947 [Battery Technology as Applied to Thermal Insulation](#)

[Daniel Scherson, Adriel J.J. Jebaraj, Jing Xu, Zhanke Feng, Nicholas Stefan Georgescu](#)

948 [Manufacture of Copper Foils for the Current Collector of Lithium-Ion Batteries By Electrochemical Deposition](#)

[Chun-Cheng Lin, Chi-Chang Hu](#)

949 [Hybrid Electrolytes for Lithium Batteries](#)

[Nitash P Balsara](#)

950 [Electroreduction of Carbon Dioxide to Syngas: From Concept to Pilot Plant](#)

[Paul J.A. Kenis](#)

951 [Perspectives on Computational Analysis of Electrocatalysis: Stability and Activity Considerations in Catalyst Screening](#)

[Jeffrey Greeley](#)

952 [The Critical Role of Supporting Electrolyte Selection on Flow Battery Cost](#)

[Mike L. Perry, Jarrod David Milshtein, Robert M. Darling, Javit A Drake, Fikile R. Brushett](#)

953 [Quantifying and Understanding Mass Transfer in Redox Flow Batteries](#)

[Jarrod David Milshtein, Kevin Tenny, John Leonard Barton, Javit A Drake, Robert M. Darling, Fikile R. Brushett](#)

954 [The Washington Clean Energy Testbeds: An Open Access Facility for Accelerating the Translation of Discovery to Product](#)

[Daniel T. Schwartz](#)

955 [Discovery to Product – an Engineer's Perspective](#)

[Dennie T Mah](#)

956 [The Study of Complexed Copper\(II\) Ion and Its Application for Electroless Copper Deposition](#)

[Hong-Ming Chang, Wei-Ping Dow](#)

957 [Electrodeposition of NiPd Alloy in Alkaline  \$\text{Ni}^{2+} - \text{Pd}^{2+} - \text{Cl}^- - \text{NH}\_3 - \text{H}\_2\text{O}\$  System](#)

[Krzysztof Mech, Jean Paul Chopart, Mirosław Wrobel, Piotr Zabinski, Konrad Szacilowski](#)

958 [Anodic  \$\text{MnO}\_2\$  deposition on Titanium Electrode Coated with Thermally Prepared Manganese Oxide](#)

[Yuuki Yoshida, Kenji Kawaguchi, Masatsugu Morimitsu](#)

959 [Impedance-Based Characterization of Raw Materials Used in Electrochemical Manufacturing](#)

[Mark E Orazem, Douglas P. Riemer](#)



[960 Electrochemical Atomic Layer Deposition: Self-Terminated Electrodeposition Reactions](#)

[Thomas P. Moffat, Yihua Liu, Sang Hyun Ahn, Nicole L. Ritzert, Rongyue Wang, Eleanor Gillette, Dincer Gokcen, Haiyan Tan, Carlos Hangarter, Leonid Bendersky, Ugo Bertocci, Hoydoo You](#)

[961 Control of Magnetism with Electrochemical Potential](#)

[Philippe Allongue, Fouad Maroun, Anne Lamirand, Nicolas Tournier, Nan Di, Rafael L Novak](#)

[962 Fabrication and Preparation of Micro-Coaxial Wires: Electrodeposition of Conductive Shields](#)

[Sara C Barron, Prasit Sricharoenchaikit, Daniela A Torres, Gregory Romano, Richard H Morrison, Andrew P Magyar, Hongmei Zhang, Caprice L Gray](#)

[963 Light Assisted Electrodeposition for Silicon Solar Cell Copper Metallization](#)

[Qiang Huang](#)

[964 The Effect of Levelers on Plating through Holes of a PCB By Using Reduced Graphene Oxide \(rGO\) As a Conducting Layer](#)

[I-Hsuan Chang, Wei-Ping Dow](#)

## **E04-Electrochemical Processing from Non-aqueous Solvents**

[965 \(Invited\) Electrodeposition of Functional Nanomaterials from Weakly Coordinating Solvents](#)

[Philip Nigel Bartlett](#)

[966 Electrochemical Lithium Deposition/Dissolution in Pressurized Solvate Ionic Liquid/Carbon Dioxide Mixtures](#)

[Morgan L. Thomas, Kenta Watanabe, Takashi Makino, Mitsuhiro Kanakubo, Kaoru Dokko, Masayoshi Watanabe](#)

[967](#)[Electrodeposition of Germanium at Elevated Temperatures and Pressures from Ionic Liquids](#)

[Jan Fransaer, Minxian Wu, Koen Binnemans](#)

[968](#)[Electrodeposition of Iron Group Metals from Ethylene Glycol Solution: From Thin Films to Nanowires](#)

[Gabriele Panzeri, Alessandra Accogli, Eugenio Gibertini, Luca Magagnin](#)

[969](#)[\(Invited\) Use of Supercritical Solvents for Electrodeposition of Thermoelectric Materials](#)

[David Andrew Cook, Philip N. Bartlett, David Christopher Smith, Gill Reid, Samuel R Marks, Wenjian Zhang](#)

[970](#)[Electroplating of Al-Nb Alloys from the Lewis Acidic Chloroaluminate Ionic Liquid](#)

[Tetsuya Tsuda, Go Matsui, Naoko Oda, Akihito Imanishi, Susumu Kuwabata](#)

[971](#)[Electrodeposition of Aluminum and Aluminum-Ruthenium Films in Ionic Liquids](#)

[Adriana Ispas, Leslie Schlag, Rene Böttcher, Heiko O. Jacobs, Andreas Bund](#)

[972](#)[Ruthenium Electrodeposition from Deep Eutectic Solvents](#)

[Roberto Bernasconi, Luca Magagnin](#)

[973](#)[Electrodeposition of Al from Dimethyl Sulfone-Aluminum Chloride Baths Under Dry Air](#)

[Masao Miyake, Hiroaki Okamoto, Mizuki Hirata, Tetsuji Hirato](#)

[974](#)[\(Invited\) Molten Sulfides for Metal Electrodeposition](#)

[Antoine Allanore](#)

[975](#)[Electrochemical Separation of Barium Ions from LiCl-KCl-BaCl<sub>2</sub> Electrolyte Using Liquid Bi and Sb Electrodes](#)

[Hojong Kim, Timothy Lichtenstein, Nathan Douglas Smith](#)

[976](#)[Experimental and Modeling Studies of Neodymium Electrodeposition from High-Temperature Chloride-Based Molten Salts](#)

[Dai Shen, Rohan Akolkar](#)

[977](#)[Electrochemical Formation of Dy and Nd Alloys Using Liquid Metal Electrodes in Molten LiCl-KCl Systems](#)

[Hirokazu Konishi, Hideki Ono, Toshiyuki Nohira, Tetsuo Oishi](#)

[978](#)[\(Invited\) Initially Placed Solid Particle Deposition for Super Efficient Systems and Possible Additive Manufacturing Applications](#)

[Salih Cihangir, Andrew P. Abbott, Karl Scott Ryder](#)

[979](#)[In Situ Monitoring of the Anodic Reactions in Secondary Batteries By Transmission Electron Microscopy](#)

[Chih-Yao Chen, Tetsuya Tsuda, Yoshifumi Oshima, Susumu Kuwabata](#)

[980](#)[All-Inorganic Nanocrystal Thin Films Fabricated By Low-Voltage Electrophoretic Deposition](#)

[Andrew D Dillon, Mohammad Taheri, Shawn Mengel, Subham Dastidar, Jason Baxter, Aaron T Fafarman](#)

[981](#)[Electroless Deposition of Disordered RuO<sub>2</sub> Nanoskins: An Example from the Fourth Quadrant of Electronic Materials](#)

[Debra R. Rolison, Michael S. Osofsky, Christopher N. Chervin, Irina R. Pala, Joseph S. Melinger, Paul A. DeSario, Martin D. Donakowski, Clifford M. Krowne, Jeffrey C. Owrutsky, Konrad M. Bussmann, Kristin M. Charipar](#)

[982 Ionic Conduction of Non-Aqueous Lithium Electrolyte Solution through Surface Modified Anodized Alumina Membrane Prepared By LPD Process Using Aqueous-Organic Mixed Solvent](#)

[Minoru Mizuhata, Shohei Seto, Hideshi Maki, Masaki Matsui](#)

[983 Electrochemical Nucleation and Growth of Metals in Molten Salts](#)

[Yuta Suzuki, Masayuki Yokota, Yoshihide Sakanaka, Yasuhiro Fukunaka, Takuya Goto](#)

[984 Pulse Electrodeposition Synthesis and Characterization of Sn Thin Films Obtained from Dimethyl Sulfoxide Solutions](#)

[Ana Ester Burgos Bravo, Ricardo Schrebler, Humberto Gomez](#)

[985 High-Speed Observation of Electrolytic Deposition of Liquid Lithium Droplets in LiCl-KCl Melt](#)

[Shungo Natsui, Takuya Sudo, Tatsuya Kikuchi, Ryosuke O. Suzuki](#)

[986 Effect of Magnetic Field on Al Electrodeposition in Ionic Liquid](#)

[Hitomi Takahashi, Hisayoshi Matsushima, Mikito Ueda](#)

[987 Removal of Ca and K from Metallic Na in NaTFSI-TEATFSI Ionic Liquids Using an Exchange Reaction](#)

[Shunta Mizukami, Hisayoshi Matsushima, Mikito Ueda](#)

## **E05-Mechanics and Metallurgy of Electrodeposited Thin Films**

[988 \(Invited\) Pulsed Electrodeposition of Refractory Metals in Ionic Liquids](#)

[Adriana Ispas, Anna Endrikat, Thomas Engemann, Ralf Peipmann, Andreas Bund](#)

[989 \(Invited\) Aluminum Layer Electrodeposition from Aqueous Solutions](#)

[John D Watkins, Xu Zhou, Hunaid B. Nulwala](#)

990 [High Speed Blind Via Filling By Copper Electrodeposition](#)

[Chun-Hsiang Lo, Wei-Ping Dow](#)

991 [Electrodeposition of Nickel Selenide Thin Films](#)

[Dawid Kutyla, Karolina Kolczyk, Piotr Zabinski, Remigiusz Kowalik](#)

992 [\(Invited\) Electrodeposition of Metals and Alloys for Graphene Growth](#)

[Lorenzo Pedrazzetti, Luca Nobili, Luca Magagnin](#)

993 [Microvia Filling By Using Insoluble Anodes in an Acidic Copper Plating Bath with a Novel Accelerator](#)

[Chu-Chi Liu, Wei-Ping Dow](#)

994 [Co-Ni Anomalous Codeposition Studies: Mechanism and Effects of Glycine](#)

[Vinicius Primo Graciano, Susana I. Cordoba de Torresi](#)

995 [Effect of Surface Properties of Titanium Anode on Surface Brightness of Electrodeposited Copper Foil](#)

[Yen Chen Lin, Chih-Han Yen, Wei-Ping Dow](#)

996 [\(Invited\) Fundamental Origin for Crack Formation Cr Films Electrodeposited from Cr<sup>3+</sup> Solutions](#)

[Kamyar Ahmadi, Nikhil Chaudhari, Timothy D Hall, E. J. Taylor, Stanko Brankovic](#)

997 [\(Invited\) In-Situ Stress Measurements during Cobalt Electrodeposition](#)

[Gery R. Stafford, Vinicius Primo Graciano, Ugo Bertocci](#)

998 [\(Invited\) Low Wear Index Chromium Coatings Electroplated from a Functional Reach-Compliant Trivalent Chromium Chemistry](#)

[Timothy D Hall, E. J. Taylor, Maria Inman, Stephen Snyder, Jing Xu, Rajeswaran Radhakrishnan](#)

999 [Atomistic Approach for Modeling the Wafer Curvature for Pseudo-Morphic and Non-Pseudo-Morphic Epitaxial Multilayer Structures](#)

[Abdul Kadir, Sivanand Somasundaram, Kenneth E. Lee, Soo Jin Chua, Eugene A Fitzgerald](#)

1000 [Effects of Additives on Copper Layer Stress Electroplated on Polyimide](#)

[Liang-Jie Lin, Wei-Ping Dow](#)

### **F01-Electrochemical Engineering General Session**

1001 [Catalytic Activity and Durability for Oxygen Evolution on La-Ni-O / Ni for Alkaline Water Electrolysis Under Potential Cycling](#)

[Yudai Tsukada, Koichi Matsuzawa, Toshiyuki Hirano, Norikazu Fujimoto, Shigenori Mitsushima](#)

1002 [Study on Separator for Alkaline Water Electrolysis](#)

[Akiyoshi Manabe, Hiroki Domon, Junko Kosaka, Takeyoshi Okajima, Takeo Ohsaka](#)

1003 [Characterization of Iron-Nickel Alloy Nanoparticles for the Oxygen Evolution Reaction As a Function of Iron-Nickel Composition](#)

[Prashant Acharya, Zachary Nelson, Lauren F Greenlee](#)

1004 [Highly Efficient Fluorine \(F\) Doped Transition Metal Non-Oxide Pnictide \(TMN\) Based Electro-Catalyst for Oxygen Evolution Reaction in Alkaline Water Electrolysis](#)

[Shrinath Dattatray Ghadge, Prasad Prakash Patel, Oleg I Velikokhatnyi, Moni Kanchan Datta, Prashanth Jampani, Prashant N Kumta](#)

1005 [Advanced Alkaline Water Electrolyzer for Renewable Hydrogen Production](#)

[Yasuhiro Nakajima, Norikazu Fujimoto, Shinji Hasegawa, Taketoshi Usui](#)

1006 [A High Performing Zero Gap Alkaline Electrolyzer](#)

[Rich Masel, Zengcai Liu, Hongzhou Yang, Syed D. Sajjad, Yan Gao, Jerry J. Kaczur](#)

1007 [Gold-Core Transition Metal Oxide-Shell Nanoparticle Electrocatalysts for Enhanced Oxygen Evolution](#)

[Alaina Leigh Strickler, María Escudero-Escribano, Thomas F Jaramillo](#)

1008 [Highly Active Nano-Perovskite Catalysts for Oxygen Evolution Reaction: Insights into Activity and Stability in Alkaline and Quasi-Neutral pH Electrolytes](#)

[Baejung Kim](#)

1009 [Analysis by the Dissipation Theorem of Turbulent Flow in a Pipe](#)

[John Newman](#)

1010 [Tesla Semi Truck - Hype or Reality: Challenges in Electrifying Light Commercial Vehicles](#)

[Shashank Sripad, Venkatasubramanian Viswanathan](#)

1011 [Capacity Fade Analysis and Direct, Efficient, and Real-Time Simulation of Physics-Based Battery Models for Stand-Alone PV-Battery Microgrids](#)

[Seong Beom Lee, Chintan Pathak, Venkatasailanathan Ramadesigan, Wenzhong Gao, Venkat R. Subramanian](#)

1012 [The Properties of a Three-Dimensional Porous Electrode Made from Cu Nanowires](#)

[Benjamin J. Wiley, Myung Jun Kim](#)

1013 [Experimental and Modeling Studies of Paper Based Methanol Fuel Cell](#)

Sweta LAL, Melepurath Deepa, Kirti CHANDRA Sahu, Vinod M Janardhanan

1014 Effects of Surfactants on the Reactivity and Durability of Shape-Controlled Pt Nanoparticles for the ORR

Mehtap Oezaslan, Isaac Adjei Safo

1015 Stabilizing Lead Cathodes for Electro-Organic Reductions

Siegfried R. Waldvogel

1016 Investigations on both Electroplating and Capacitive Removal of Lead from Waste Water

Daniel J Blackwood, Yang Gui

1017 Formation Mechanisms of Needles in Porous Silicon Based Needle-like Surfaces

Shervin Keshavarzi, Ulrich Mescheder, Holger Reinecke

1018 Fabrication of High-Stability Solid-State Receiver Electrodes in Exploration System for Detecting High-Resistive Gas Hydrates

Chu-Shan Kuo, Hao-Ting Peng, Jeng-Yu Lin

1019 Electrophoretic Deposition of Titanium Nitride Onto 316 Stainless Steel As a Bipolar Plate for Fuel Cell Application

Doohee Lee, Eunji Lee, Jaesik Yoon, Benjamin Keith, Tae-Sik Oh, Sung Pil Woo, Young Soo Yoon, Dong-Joo Kim

1020 Effects of Thermal Treatments on Compact and Nanotubular Anodic Films on Titanium

Andrea Gomez Sanchez, Mariela Desimone, Silvia Ceré

1021 Electrochemical Ammonia Synthesis Via Nitrogen Reduction Under Mild Conditions



[Ben Sheets, Gerardine G Botte](#)

## **F02-Electrochemical Separations**

[1022\(Invited\) PBI Membrane Development for Fuel Cells and Electrochemical Separations](#)

[Andrew T Pingitore, Guoqing Qian, Taylor R Garrick, Cody H Wilkins, John W. Weidner, Brian C Benicewicz](#)

[1023A Self-Forming Membrane for Advanced Electrochemistry-Based CO2 Capture](#)

[Peng Zhang, Jingjing Tong, Kevin Huang](#)

[1024Hydrogen Isotope Separation By Using Alkaline Fuel Cell](#)

[Ryota Ogawa, Hisayoshi Matsushima, Mikito Ueda, Richard Dawson](#)

[1025Innovative Separation Technology for Lithium-6 Enrichment Using Electrodialysis with Lithium Ionic Superconductor](#)

[Tsuyoshi Hoshino](#)

[1026\(Invited\) Assessing Impacts of Material Chemistry and Operation Strategies on Capacitive Deionization Energy Consumption and Cost](#)

[Steven M Hand, Roland D Cusick](#)

[1027Shock Electrodialysis As an Aqueous Separation Platform](#)

[Kameron Michael Conforti, Sven Schlumpberger, Martin Z. Bazant](#)

[1028Investigation on the Performance of Electrolytic Processing of Kraft Pulping Black Liquor](#)

[Jean-Noël Cloutier, Jean Paris, Oumarou Savadogo, Michel Perrier, Raynald Labrecque, Pascal Champagne](#)

[1029](#)[Water Desalination Via Hybrid Capacitive Deionization with Tunnel Manganese Oxides As Redox Active Electrodes](#)

[Bryan Byles, Ekaterina Pomerantseva](#)

[1030](#)[\(Invited\) The Promise and Challenges of Using Selective Ion Insertion Electrodes for Water Deionization](#)

[Sneha Shanbhag, Yousuf Bootwala, Jay Whitacre, Meagan Mauter](#)

[1031](#)[\(Invited\) Using Intercalation Compounds for Electrochemical Water Desalination](#)

[Kyle Christopher Smith](#)

[1032](#)[\(Invited\) Capacitive Deionization of High-Salinity Water Using Ion-Exchange Membranes](#)

[Kexin Tang, Yong-ha Kim, Sotira Yiacomou, Costas Tsouris](#)

[1033](#)[Water Desalination By Pseudocapacitive Deionization](#)

[Taeyoung Kim, Christopher A. Gorski, Bruce E. Logan](#)

[1034](#)[Sodium Titanium Phosphate As Cation Insertion Electrode for Electrochemical Separation Systems](#)

[Yousuf Bootwala, Sneha Shanbhag, Jay Whitacre, Meagan Mauter](#)

### **F03-Electrochemical Conversion of Biomass**

[1035](#)[Kinetic Modeling of Bio-Oil Conversion By Electrocatalytic Hydrogenation and Deoxygenation](#)

[Sabyasachi Das, Christopher M. Saffron](#)

[1036](#)[Electrochemical and Spectroscopic Studies of Oxidation of Biomass Mimics By Cobalt Complexes](#)

[Luke T. Servedio, Shane Foister, Thomas A. Zawodzinski](#)

1037 [Viologen-Catalyzed Conversion of Carbohydrates in a Biofuel Cell for Sustainable Energy](#)

[Meisam Bahari, Scott Carter, Hilary Bingham, Gerald D. Watt, Randy Lewis, John N. Harb](#)

1038 [Electrocatalytic Biomass Valorization Integrated with Hydrogen Production](#)

[Yujie Sun](#)

1039 [Electro-Conversion of Renewables Originating from Waste Streams of the Pulping Process](#)

[Siegfried R. Waldvogel](#)

1040 [Study the Mechanism of the Electrochemical Oxidation of Lignin Model Compounds](#)

[Raziyeh Ghahremani, John A Staser](#)

1041 [Electrochemical Conversion of Bio-Sourced Alcohols / Polyols and Saccharides for Platform Molecules and Hydrogen Cogeneration](#)

[Stève Baranton, Jesús González-Cobos, Anna Zalineeva, Thibault Rifaideen, Hana Bensalem, Mário Simões, Karine De Oliveira-Vigier, Christophe Coutanceau](#)

1042 [Continuous Electrochemical Reactor for Conversion of Biorefinery Lignin to Aromatic Compounds](#)

[Mahtab NaderiNasrabadi, John A Staser](#)

1043 [Accessing New Monomers from Bioprivileged Molecules By Coupling Metabolic Engineering and Electrosynthesis](#)

[John Edward Matthiesen, Sanaz Abdolmohammadi, Eric W. Cochran, Jean-Philippe Tessonnier](#)

[1044 Coupled Microbial Electrolysis Cells and Struvite Precipitation for Enhanced Nutrient Recovery from Wastewater](#)

[Brian Skinn, Laura Southworth, Sohumi Patel, Stephen Snyder, Roland D Cusick, Maria Inman, E. J. Taylor](#)

[1045 Composite Photoelectrocatalysts for Tempo-mediated Alcohol Oxidations](#)

[David J Chadderdon, Ivy Wu, Matthew G Panthani, Wenzhen Li](#)

[1046 Understanding the Economic Feasibility of Valorizing Lignocellulosic Biomass through Electrochemical Hydrogenation](#)

[Michael Julian Orella, Steven Michael Brown, Yuriy Roman, Fikile R. Brushett](#)

[1047 Selective Hydrogenations in Proton Exchange Membrane Reactor](#)

[Sarah Carl, Krysta Waldrop, Peter N Pintauro, Levi T Thompson](#)

[1048 Mechanistic Insights into Furfural Reduction on Metal Electrodes: Distinguishing Pathways for Selective Hydrogenation of Biorenewable Oxygenates](#)

[Xiaotong Chadderdon, David J Chadderdon, John Edward Matthiesen, Jean-Philippe Tessonnier, Wenzhen Li](#)

[1049 Electrochemical Flow Cell for the Upgrading of Biomass Derived Streams](#)

[Luis A. Diaz, Tedd E. Lister](#)

[1050 Effects of Applied Potentials and Copper Electrocatalysts on Electrochemical Hydrogenation and Hydrogenolysis of Furfural in Acidic Solution](#)

[Sungyup Jung, Alexandros N Karaiskakis, Elizabeth J Biddinger](#)

[1051 Towards Sustainable Fuels from Biomass Using Fast Pyrolysis and Electrocatalysis in Regional Depots](#)

[Christopher M. Saffron, Sabyasachi Das, Peyman Fasahati, Mahlet Garedeu, Chun Ho Lam, James E. Jackson](#)

1052 [Electrocatalytic Reduction of Carbonyl Groups in Aromatic Molecules: A Step Towards Electrochemical Bio-Oil Conversion](#)

[Oliver Y Gutiérrez Tinoco, Udishnu Sanyal, Sneha Akhade, Juan A Lopez Ruiz, Donald Camaioni, Jamelyn Holladay, Johannes A Lercher](#)

1053 [Functionality Impacts on Reaction Rates for Simple Mixtures of Aldehydes and Ketones](#)

[Jamelyn Holladay, Juan A Lopez Ruiz, Michael Lilga, Asanga Padmaperuma, Sneha Akhade](#)

1054 [Towards Controlling the Electrocatalytic Hydrogenation of Oxygenated Hydrocarbons through Particle Size Effects](#)

[Udishnu Sanyal, Oliver Y Gutiérrez Tinoco, Donald Camaioni, Abhijeet Karkamkar, Mirosław Derewinski, Johannes A Lercher](#)

## **G01-15th International Symposium on Semiconductor Cleaning Science and Technology (SCST 15)**

1055 [\(Invited\) Challenges on Surface Conditioning in 3D Device Architectures: Triple-Gate FinFETs, Gate-All-Around Lateral and Vertical Nanowire FETs](#)

[Anabela Veloso, Vasile Paraschiv, Emma Vecchio, Katia Devriendt, Waikin Li, Eddy Simoen, B. T. Chan, Zheng Tao, Erik Rosseel, Roger Loo, Alexey P. Milenin, Bernardette Kunert, Lieve Teugels, Farid Sebaai, Christophe Lorant, Dennis van Dorp, Efraín Altamirano-Sánchez, Stephan Brus, Philippe Marien, Claudia Fleischmann, Davit Melkonyan, Trong Huynh-Bao, Geert Eneman, Geert Hellings, Arturo Sibaja-Hernandez, Philippe Matagne, Niamh Waldron, Dan Mocuta, Nadine Collaert](#)

1056 [\(Invited\) Wetting, Adhesion and Stiction of 2D Materials](#)

[Stijn F. L. Mertens](#)

1057 [Ultimate Limits of Pattern Stability Due to Thermal Vibrations](#)

Derek Bassett, Antonio Rotondaro

1058Surface Treatment Method and Its Metrology for Preventing Pattern Collapse

Chuannan Bai, Jingjing Wang, Eugene Shalyt

1059Solid Phase Clean: Improving Performance for Smaller Particle Removal without Pattern Damage and Film Loss

Meitoku Aibara, Kenji Sekiguchi, Miyako Kaneko, Derek Bassett, Itaru Kanno

1060Nano-Structures Stiction Suppression by Molecular Structure Optimized Surface Energy Reduction Agent

Tatsuhiko Koide, Shinsuke Kimura, Hiroyasu Imori, Tomohiko Sugita, Katsuhiro Sato, Soichi Kumon, Yoshiharu Terui, Yuzo Okumura, Yoshihiro Ogawa

1061An Accurate Method for Determining Pattern Collapse Occurrence for Nano-Structures

Hiroshi Marumoto, Hisashi Kawano

1062Study of Mass Transport for Efficient Fluid Processing

Paul W. Mertens, Michael Haslinger, Marton Soha, Joachim John

1063Effect of VUV Lamp on Wafer Charging by Single-Wafer Wet Clean

Ken-ichi Sano, Rafal Dylewicz, Xia Man, David Lou, Ji Zhu, Greg Harm, Mark N Kawaguchi

1064Post Cleaning for FEOL CMP with Silica and Ceria Slurries

Wei-Tsu Tseng, Amarnath Jha, Derek Stoll, Changhong Wu, Tim McCormack, Ji Chul Yang

1065Deep Trenches Cleanliness Challenges for CMOS Image Sensors

[Philippe Garnier, Franck Dignat, Côme De Buttet](#)

[1066 Room Temperature Photoluminescence Characterization of Silicon Wafers for In-Line Monitoring Applications](#)

[Woo Sik Yoo, Toshikazu Ishigaki, Kitaek Kang](#)

[1067 A Novel Cleaning Approach to Remove the Carbon Contaminant from Ru Surface of EUV Mask](#)

[Min-Su Kim, Hee-Jin Song, Hyun-Tae Kim, Jin-Goo Park](#)

[1068 \(Invited\) Reactivity of Water Vapor with Ultrathin GeO<sub>2</sub>/Ge and SiO<sub>2</sub>/Si Structures Investigated by Near-Ambient-Pressure X-ray Photoelectron Spectroscopy](#)

[Kenta Arima, Takuji Hosoi, Heiji Watanabe, Ethan J Crumlin](#)

[1069 Study of SiGe Surface Cleaning](#)

[Kana Komori, Kurt Wostyn, Dirk Rondas, Jana Loya Prado, Thierry Conard, Roger Loo, Lars-Åke Ragnarsson, Naoto Horiguchi, Frank Holsteys](#)

[1070 Stability of SiGe\(100\) Surfaces after Ammonium Sulfide Passivation](#)

[Stacy Lynn Heslop, Lauren Peckler, Anthony J. Muscat](#)

[1071 The Impact of Dummy Gate Processing on Si-Cap-Free SiGe Passivation: A Physical Characterization Study on Strained SiGe 25% and 45%](#)

[Kurt Wostyn, Lars-Åke Ragnarsson, Tom Schram, Liesbeth Witters, Thierry Conard, Bastien Douhard, Danielle Vanhaeren, Frank Holsteys, Wilfried Vandervorst, Naoto Horiguchi](#)

[1072 \(Invited\) Speciation during Wet Etching of III-V Semiconductors](#)

[Adam Hinckley, Elijah Foster, Tim Corley, Anthony J. Muscat](#)

[1073Environmental Impact and Speciation Analysis of Chemical Mechanical Planarization \(CMP\) Waste Following GaAs Polishing](#)

[Steven Crawford, Shyam Aravamudhan](#)

[1074Thermally Activated Gas-Phase Chemical Reactions in a Single-Wafer Wet Clean Process](#)

[Mark N Kawaguchi, Ji Zhu, Christian Fischer, Xia Man, Bhaskar Bandarapu, Stanley Kon](#)

[1075Nanometric Particles Removal during Photoresist Stripping](#)

[Adeline Lallart, Philippe Garnier, Christian Pizzetti, Elise Lorenceau, Alain Cartellier, Elisabeth Charlaix](#)

[1076Nearly Anhydrous Undissociated HF for the Removal of Hf / Ta / Zr Based Polymers after Plasma Etch, Selectively to Aluminum](#)

[Marine Cazes, Lucile Broussous, Philippe Garnier, Christian Pizzetti, Laurence Gabette, Pascal Besson](#)

[1077Characterization of Ammonium Silicate Residue during Polysilazane \(PSZ\) Dry Etching in  \$\text{NF}\_3/\text{H}\_2\text{O}\$  Gas Chemistry](#)

[Hyun-Tae Kim, Min-Su Kim, Jong-Seok Lee, Geun-Min Choi, Jin-Goo Park](#)

[1078Nickel Contamination from Caustic Etching of Silicon Wafers](#)

[Drew Sinha](#)

[1079Study of Copper Surface Preparation by Sequential Atomic Layer Wet Etching and Laser Annealing Treatments](#)

[Akihisa Iwasaki, Yuya Akanishi, Fulvio Mazzamuto, Els Kesters, Quoc Toan Le, Frank Holsteyns](#)

[1080Reduced Anisotropy in Tetramethylammonium Hydroxide Based Silicon Etchants](#)



[Glenn Westwood, Chien-Pin Sherman Hsu](#)

1081 [Modification of DHF for Removal of Metals from Silicon Wafer](#)

[Dong-Hwan Lee, Hee-Jin Song, Sung-Hae Jang, Hyun-Tae Kim, Jae-Hwan Yi, Eun-Suck Choi, Jin-Goo Park](#)

1082 [Electrolyzed Water for Selective Etching of Metals](#)

[Patricia Laboureur, Ann-Kristine Neelsen, Gerfried Zwicker, Matthias Fryda](#)

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[Keren J. Kanarik](#)

1084 [\(Invited\) Thermal Cyclic Atomic-Level Etching of Nitride Films: A Novel Way for Atomic-Scale Nanofabrication](#)

[Kazunori Shinoda, Nobuya Miyoshi, Hiroyuki Kobayashi, Masaru Kurihara, Masaru Izawa, Kenji Ishikawa, Masaru Hori](#)

1085 [Etching with Low  \$T\_e\$  Plasmas](#)

[Scott G Walton, David R. Boris, Sandra Catalina Hernandez, Samantha G Rosenberg, Hiroyuki Miyazoe, Ashish V Jagtiani, Sebastian U Engelmann, Eric A Joseph](#)

1086 [\(Invited\) Materials Selectivity in Atomic Layer Etching of  \$\text{SiO}\_2\$ , Si, and  \$\text{Si}\_3\text{N}\_4\$  Using Plasma Process Sequences](#)

[Gottlieb S. Oehrlein](#)

1087 [\(Invited\) Research to Manufacturing: ALD Design for Precision Atomic Layer Fabrication](#)

[Adrien R. LaVoie, Purushottam Kumar](#)

[1088ALD TiN Schottky Gates for Improved Electrical and Thermal Stability in III-N Devices](#)

[Virginia D. Wheeler, Travis J Anderson, Shihyun Ahn, David I Shahin, Marko J Tadjer, Andrew D. Koehler, Karl D Hobart, Fan Ren, Francis J Kub, Aris Christou, Charles R. Eddy](#)

[1089ALD of Fluorine-Free Boron-Containing Composite Layers for Shallow Dopant Source Applications](#)

[Anil U. Mane, Jian Liu, Omar Farha, Steven Letourneau, Krzysztof Z. Pupek, Joseph T. Hupp, Jeffrey W Elam](#)

[1090Dielectric-MoS<sub>2</sub> Interfaces Grown By Atomic Layer Deposition](#)

[Steven Letourneau, Anil U. Mane, Jeffrey W Elam, Elton Graugnard](#)

[1091\(Invited\) Selective Atomic Layer Deposition of Cobalt for Back End of Line](#)

[Tyler D.-M. Elko-Hansen, John Gilbert Ekerdt](#)

[1092\(Invited\) Area-Selective Atomic Layer Deposition: Role of Surface Chemistry](#)

[Alfredo Mameli, Bora Karasulu, Marcel A. Verheijen, Adriaan J.M. Mackus, W. M. M. Kessels, Fred Roozeboom](#)

[1093\(Invited\) Photo-Assisted ALD: Process Development and Application Perspectives](#)

[Ville Miikkulainen, Katja Väyrynen, Väinö Kilpi, Zhongmei Han, Marko Vehkamäki, Kenichiro Mizohata, Jyrki Räisänen, Mikko Ritala](#)

[1094Atomic Layer Deposition Lithium Fluoride As Coatings for Lithium-Ion Batteries](#)

[Lin Chen, Jeffrey W Elam, Joseph A. Libera](#)

[1095Insights Towards Mitigated Mn Dissolution through Structure-Sensitive Al<sub>2</sub>O<sub>3</sub> Film Nucleation on LiMn<sub>2</sub>O<sub>4</sub> By Atomic Layer Deposition](#)

[Robert Warburton, Lin Chen, Marton Voeroes, Hakim Iddir, Kan-Sheng Chen, Joseph Liberia, Mark C. Hersam, Larry A Curtiss, Jeffrey W Elam, Jeff Greeley](#)

1096[Exploring Electrochemical Energy Storage of SnO<sub>2</sub>, Sn<sub>3</sub>N<sub>4</sub>, and SnO<sub>x</sub>N<sub>y</sub> through Ald](#)

[David Murdock Stewart, Alex Pearse, Keith Gregorczyk, Gary W Rubloff](#)

1097[Molecular Layer Deposition for Applications in Lithium-Ion Batteries](#)

[Kevin Van de Kerckhove, Felix Mattelaer, Jolien Dendooven, Christophe Detavernier](#)

1098[Conformal Vanadium Oxides Beyond Crystalline V<sub>2</sub>O<sub>5</sub> As High Energy Density 3D Thin-Film Electrodes for Lithium-Ion Batteries](#)

[Felix Mattelaer, Kobe Geryl, Thomas Dobbelaere, Geert Rampelberg, Jolien Dendooven, Christophe Detavernier](#)

1099(a href="#">Invited) Enabling New Domains of Energy Storage through Atomic Layer Deposition

[Gary W Rubloff](#)

1100[Digital Doping of ALD VO<sub>2</sub> for Thermochromic Applications](#)

[Alexander C Kozen, Marc Currie, Katherine L Jungjohann, Brian P. Downey, Charles R Eddy, Jr., Virginia D. Wheeler](#)

1101[Optimizing Process Parameters for Plasma Assisted Atomic Layer Deposition](#)

[David R. Boris, Virginia D. Wheeler, Virginia R Anderson, Neeraj Nepal, Samantha G Rosenberg, Alex C Kozen, Jennifer K Hite, Scott G Walton, Charles R. Eddy](#)

1102(a href="#">Invited) Molecular Layer Deposition from Dissolved Precursors

[Johannes Fichtner, Yanlin Wu, Jakob Hitzenberger, Thomas Drewello, Julien Bachmann](#)

[1103 Reusable Sorbent for Oil Spill Cleanup Fabricated Using Sequential Infiltration Synthesis](#)

[Jeffrey W Elam, Jason R Avila, Edward F. Barry, Seth B. Darling, Joseph A. Libera, Anil U. Mane](#)

[1104 Hybrid Photoelectrochemical Systems Based on Self-Organized TiO<sub>2</sub> Nanotubes ALD Coated with Chalcogenides](#)

[Milos Krbal, Filip Bures, Raul Zazpe, Jan Prikryl, Filip Dvorak, Hanna Sopha, Jan M. Macak](#)

[1105 Atomic Layer Deposition of NbC-Al<sub>2</sub>O<sub>3</sub> Composite Films for Efficient Solar Selective Coatings](#)

[Jason R Avila, Aaron Peters, Anil U. Mane, Joseph A. Libera, Angel Yanguas-Gil, Omar Farha, Joseph T. Hupp, Jeffrey W Elam](#)

[1106 \(Invited\) Atomic Layer Deposition of Cobalt, Nickel, and Iron Sulfides: Synthesis and Applications](#)

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[1107 Interfaces Formed by ALD Metal Oxide Growth on Metal Layers](#)

[Stephan Aussen, Alexander Hardtdegen, Katharina Skaja, Susanne Hoffmann-Eifert](#)

[1108 \(Invited\) Atomic Layer Deposition of Nanoalloys of Noble and Non-Noble Metals](#)

[Ranjith K. Ramachandran, Jolien Dendooven, Matthias Filez, Vladimir V. Galvita, Hilde Poelman, Eduardo Solano, Matthias M. Minjauw, Guy B. Marin, Christophe Detavernier](#)

[1109 \(Invited\) ALD Metal Fluorides for Ultraviolet Filter and Reflective Coating Applications](#)

[John Hennessy, April Jewell, Shouleh Nikzad](#)

[1110 Interface Studies of III-V Semiconductors and Oxides with an In-Situ Spectroscopic Ultra-High Vacuum \(UHV\) System Capable of Atomic Layer Deposition \(ALD\) and Atomic Layer Etch \(ALEt\)](#)

[Thomas James Larrabee, S. M. Prokes](#)

[1111 Synthesis of ALD Iridium Thin Films on Silicon and Monel K-500 Steel Substrates](#)

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[1112 \(Keynote\) Devices in CMOS for Terahertz Circuits and Systems](#)

[Kenneth K. O, Zeshan Ahmad, Wooyeol Choi, Navneet Sharma, Jing Zhang, Qian Zhong, Dae-Yeon Kim, Zhiyu Chen, Yaming Zhang, Ruonan Han, Dongha Shim, Swaminathan Sankaran, Eun-Yong Seok, Sandeep Kshattray, Changhua Cao, Chuying Mao, Robert Schueler, Ivan Medvedev, David Lary, Hyun-Joo Nam, Philip Raskin, Frank De Lucia, James P. McMillan, Christopher Neese, Insoo Kim, Ibukunoluwa Momson, Pavan Yelleswarapu, Shenggang Dong, Pranith Byreddy, Zhe Chen](#)

[1113 \(Keynote\) Lasing from SiGeSn/GeSn Multiple Quantum Well Structures](#)

[Detlev Grützmacher, Dan Buca, Daniela Stange, Nils von den Driesch, Thomas Zabel, Hans Sigg](#)

[1114 \(Keynote\) Interface Control for High Performance N-Channel Ge FETs](#)

[Akira Toriumi](#)

[1115 \(Invited\) Modelling and Simulation of Advanced Semiconductor Devices](#)

[Fikru Adamu-Lema, Meng Duan, Salim Berrada, Jaehyun Lee, T. Al-Ameri, Vihar Georgiev, Asen Asenov](#)

[1116 \(Invited\) Non Volatile Resistive and Magnetic Memories: Materials, Integration Challenges and Opportunities](#)

[Marie-Claire Cyrille, Etienne Nowak, Luc Tillie, Gabriel Molas, Gabriele Navarro,](#)

[Véronique Sousa, Niccolo Castellani, Elisa Vianello, Nathalie Lamard, Youssouf Guerfi, Juergen Langer, Berthold Ocker, Olivier Boule, Gilles Gaudin, Kevin Garello, Pietro Gambardella, Luca Perniola](#)

1117(Invited) [A Confined Phase Change Memory for M-Type Storage Class Memory](#)

[Wanki Kim, Matt BrightSky, Takeshi Masuda, Sangbum Kim, Robert Bruce, Fabio Carta, Gloria Fraczak, Asit Ray, Yu Zhu, Koukou Suu, Chung Lam](#)

1118(Invited) [P-Type 3C-SiC Photocathode for Solar to Hydrogen Energy Conversion](#)

[Masashi Kato](#)

1119(Invited) [Achievement of Ultralow Contact Resistivity of Metal/n<sup>+</sup>-Ge Contacts with Zr-N-Ge Amorphous Interlayer](#)

[Hiroshi Nakashima, Hayato Okamoto, Keisuke Yamamoto, Dong Wang](#)

1120(Invited) [Ultrathin Epitaxial Silicides for Semiconductor Contacts](#)

[Filip Geenen, Cristian Mocuta, Christophe Detavernier](#)

1121 [Reconsideration of Metal Work Function at Metal/Semiconductor Interface](#)

[Tomonori Nishimura, Takeaki Yajima, Akira Toriumi](#)

1122 [Experimental Study of PVD Cu/CVD Co Bilayer Dissolution for BEOL Cu Interconnect Applications](#)

[Xiaoxuan Sun, Brown Peethala, Marinus Hopstaken, Chao-kun Hu, Paul S Mclaughlin, O. van der Straten, James Demarest, K. Motoyama, Takeshi Nogami, Xuan Lin, Xunyuan Zhang, James Kelly](#)

1123 [Development of Advanced Cobalt CMP Slurry Platform By Electrochemical Screening and Polishing Studies](#)

[Murali Ganth Theivanayagam, Hongyu Wang, Matthew VanHanehem, Robert Auger](#)

1124(Invited) Impact of the Metal Gate on the Oxide Stack Quality Assessed by Low-Frequency Noise

Eddy Simoen, Liang He, Barry O'Sullivan, Anabela Veloso, Naoto Horiguchi, Nadine Collaert, Cor Claeys

1125(Invited) High-K Evolution: Subnanometer EOT Challenges and Future Perspectives for Scaling

Hei Wong, Jieqiong Zhang, Hiroshi Iwai, Kuniyuki Kakushima

1126(Invited) Epitaxial Ge/GeSn High Mobility Channel Transistors

C. W. Liu, I-Hsieh Wong, Fang-Liang Lu, Yu-Shiang Huang

1127The Effect of Low Temperature Annealing on the Deactivation and Defect Formation in Highly Doped Si:P Epitaxially Grown Films

Zach Weinrich, David Lee Brown, Amalie Atassi, Xuebin Li, Shashank Sharma, Hua Chung, Kevin Scott Jones

1128(Invited) Processing and Characterization of High Density Si/Ge Quantum Dots for Electroluminescent Devices

Seiichi Miyazaki, Kentaro Yamada, Katsunori Makihara, Mitsuhisa Ikeda

1129(Invited) Evaluation of Coupled Triple Quantum Dots with Compact Device Structure

Yasuo Takahashi, Takafumi Uchida, Atsushi Tsurumaki-Fukuchi, Masashi Arita, Akira Fujiwara

1130Deep Level Assessment of n-Type Si/SiO<sub>2</sub> Metal-Oxide-Semiconductor Capacitors with Embedded Ge Quantum Dots

Mansour Aouassa, Henk Vrielinck, Eddy Simoen

1131Substrate Effect on Light Emission of SSI-LEDs

[Shumao Zhang, Yue Kuo, Xiaoning Zhang](#)

1132 [Electrical Characteristics of Fluorine-Doped Zinc Oxynitride Thin-Film Transistors](#)

[Hyoung-Do Kim, Jong-Heon Kim, Hyun-Suk Kim](#)

1133 (Invited) [Conductive Polymer/Metal Composite for Filling of TSV](#)

[Jin Kawakita, Toyohiro Chikyow](#)

1134 (Invited) [Sequential 3D Process Integration: Opportunities for Low Temperature Processing](#)

[Sébastien Kerdilès, Pablo Acosta-Alba, Benoit Mathieu, Marc Veillerot, Hervé Denis, François Aussenac, Fulvio Mazzamuto, Inès Toque-Tresonne, Karim Huet, Marie-Pierre Samson, Bernard Previtali, Laurent Brunet, Perrine Batude, Claire Fenouillet-Beranger](#)

1135 [Three-Layered Stacking Process by Au/SiO<sub>2</sub> Hybrid Bonding for 3D Structured Image Sensors](#)

[Yuki Honda, Masahide Goto, Toshihisa Watabe, Kei Hagiwara, Masakazu Nanba, Yoshinori Iguchi, Takuya Saraya, Masaharu Kobayashi, Eiji Higurashi, Hiroshi Toshiyoshi, Toshiro Hiramoto](#)

1136 [Topographic Complexities and Solutions for High Density BEOL MIM Capacitors](#)

[Lili Cheng, Shinichiro Kakita, Robert Fox, Emiko Motoyama, Jusang Lee, Nabil Azad, Gregory Hart, Sun Ham, Ankur Sharma, Felix Beaudoin, Galor Wenyi Zhang, Ernesto Gene de la Garza, Pietro Babighian, Tao Wang, Xiaoming Yang, Rod Augur, Teck Jung Tang](#)

1137 (Invited) [Nanofabrication of Devices Using Scanning Force Microscopes](#)

[Vincent Bouchiat](#)

1138 [Etching Methods for STT-MRAM](#)

[E. J. O'Sullivan, Anthony J Annunziata, Jemima Gonsalves, G. Hu, Eric A Joseph,](#)



Raman Kothandaraman, Gen Lauer, Nathan Marchack, J. J. Nowak, R. P. Robertazzi, J. Z. Sun, Thitima Suwannasiri, P. L. Trouilloud, Yu Zhu, D. C. Worledge

1139 Via Bottom Profile Optimization in All-in-One Etch with Double Patterning Scheme

Ke-Fang Yuan, Jun-Qing Zhou, Min-Da Hu, Qi-Yang He, Hai-Yang Zhang

1140 The Improvement of the Pattern Wiggling Profile by Photo Resist Treatment

Pan-Pan Liu, Cheng-Long Zhang, Hai-Yang Zhang

1141 (Invited) FinFET Technology

Kanguo Cheng

1142 (Invited) Low Power Tunneling FET Technologies Using Ge/III-V Materials

Shinichi Takagi, Dae-Hwan Ahn, Munetaka Noguchi, Sanghee Yoon, Takahiro Gotow, Koichi Nishi, Minsoo Kim, Tae-Eon Bae, Takumi Katoh, Ryo Matsumura, Ryotaro Takaguchi, Mitsuru Takenaka

1143 The Impact of Tunnel FET on Heavy Ion Induced Transient Effect

Yan Wu, Yoshihiro Takahashi

1144 (Invited) Diverse Accessible Heterogeneous Integration (DAHI) Foundry at Northrop Grumman Aerospace Systems (NGAS)

Augusto Gutierrez-Aitken, Dennis Scott, Ken Sato, Ben Poust, Eric Nakamura, Khanh Thai, Wes Chan, Eric Kaneshiro, Cedric Monier, Ioulia Smorchkova, Nancy Lin, Dino Ferizovic, Xiang Zeng, Aaron Oki, Reynold Kagiwada

1145 (Invited) SiGe BiCMOS Heterogeneous Integration Using Wafer Bonding Technologies

Matthias Wietstruck, Mehmet Kaynak, Andreas Mai

1146 (Invited) Past, Present and Future Challenges of Thermal Management of Electronics Packaging

[Gamal Refai-Ahmed](#)

[1147\(Invited\) Flexible Electronics for Low-Cost Applications: Process and Assembly Challenges](#)

[Ross Bringans](#)

[1148\(Invited\) How to Integrate MEMS on Foundry-Fabricated CMOS Backplanes](#)

[Matthias Schulze, Christoph Hohle, Martin Friedrichs](#)

[1149\(Invited\) Detection of Bacterial Fluorescence by the Combination of MEMS Microfluidic Chip and Si Photodetector toward On-Chip Biological Sensing](#)

[Shuhei Onishi, Choi Yong Joon, Makoto Ishida, Kazuaki Sawada, Hiromu Ishii, Katsuyuki Machida, Kazuya Masu, Yasuhiko Nikaido, Mitsumasa Saito, Shinichi Yoshida](#)

[1150\(Invited\) Epitaxial CVD Growth of Ultra-Thin Si Passivation Layers on Strained Ge Fin Structures](#)

[Roger Loo, Hiroaki Arimura, Daire J. Cott, Liesbeth Witters, Geoffrey Pourtois, Andreas Schulze, Bastien Douhard, Wendy Vanherle, Geert Eneman, Olivier Richard, Paola Favia, Jerome Mitard, Dan Mocuta, Robert Langer, Nadine Collaert](#)

[1151\(Invited\) Growth and Applications of Si<sub>1-x</sub>Sn<sub>x</sub> Thin Films](#)

[Masashi Kurosawa, Osamu Nakatsuka, Shigeaki Zaima](#)

[1152\(Invited\) Functional Oxides for Energy Efficient Information Technology](#)

[Catherine Dubourdieu](#)

[1153\(Invited\) The Roadmap to Applications of Graphene and Related Materials](#)

[A C. Ferrari](#)

[1154\(Invited\) Scalable Growth of Two-Dimensional Materials – a Prerequisite for Process Integration](#)

[Satender Kataria, Stefan Wagner, Max Christian Lemme](#)

[1155\(Invited\) Gallium Oxide Power Devices Fabricated By Novel Processes](#)

[Kentaro Kaneko, Toshimi Hitora, Shizuo Fujita](#)

[1156\(Invited\) Ultrapure Homoepitaxial Diamond Films Grown by Chemical Vapor Deposition](#)

[Tokuyuki Teraji](#)

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[1157\(Invited\) Thermal Transport and Thermal Management By Silicon Nanostructures](#)

[Jaeho Lee](#)

[1158\(Invited\) Metal Organic Frameworks for Thermoelectric Energy Conversion Applications](#)

[Albert Alec Talin](#)

[1159\(Invited\) Peltier Supercooling with Isosceles Current Pulses: Cooling an Object with Internal Heat Generation](#)

[Alfred J Piggott, Jeffrey S Allen](#)

[1160\(Invited\) Thermal and Thermoelectric Transport in Semiconductor Nanowires](#)

[Renkun Chen](#)

[1161\(Invited\) 2D Materials for Solid State Thermionic Power Generation](#)

[Mona Zebarjadi](#)

[1162\(Invited\) Soft Mode Phase Transition and the Lattice Thermal Conductivity of PbTe-Based Materials](#)

[Ivana Savic](#)

[1163Thermoelectric Properties of 2D Ni<sub>3</sub>\(HITP\)<sub>2</sub> and 3D Cu<sub>3</sub>\(BTC\)<sub>2</sub> MOFs: First-Principles Studies](#)

[Yuping He, A. Alec Talin, Mark D. Allendorf](#)

[1164\(Invited\) Exploring Thermoelectric Materials Using Predictive Theoretical Modeling](#)

[Jesse Maassen, Vahid Askarpour](#)

[1165Air-Stable n-Type Polymers for Thermoelectric Applications](#)

[Akanksha Menon, Rylan Wolfe, Shannon K. Yee, Seth Marder, John R Reynolds](#)

[1166\(Invited\) Review of Recent Progress in Nanoscaled Thermoelectric Thin Films](#)

[Helmut Baumgart, Xin Chen, Pengtao Lin, Kai Zhang](#)

[1167\(Invited\) Effect of Annealing on Thermoelectric Properties of Electrodeposited Bi<sub>2</sub>Te<sub>3</sub> Films](#)

[Swatchith Lal, Devendraprakash Gautam, Kafil M. Razeeb](#)

[1168\(Invited\) Manipulating Electrical and Thermal Transport in Nanowire Based Nanocomposite through Doping for Thermoelectric Applications](#)

[Yue Wu](#)

[1169\(Invited\) Nanostructured Thermoelectric Materials Prepared from Bi<sub>2</sub>Se<sub>3</sub> and Bi<sub>2</sub>Te<sub>3</sub> Nanoplates for Enhanced Thermoelectric Properties](#)

[Jong Wook Roh, Sungwoo Hwang, Dae Jin Yang, Han In Tack](#)

[1170\(Invited\) Nanocomposite-Based Nanogenerators for Thermal Energy Harvesting and Self-Powered Sensing Applications](#)

[Zong-Hong Lin](#)

[1171\(Invited\) Molten Semiconductors for High Temperature Thermoelectricity](#)

[Youyang Zhao, Charles Cooper Rinzler, Antoine Allanore](#)

[1172\(Invited\) Flexible and Stretchable Thermoelectric Generators](#)

[Muhammad M. Hussain, Jhonathan P. Rojas, Devendra N. Singh, Galo A. Torres Sevilla, Hossain M. Fahad, Salman B. Inayat](#)

[1173\(Invited\) High Performance and Flexible Nanostructured Thermoelectric Devices By Additive Printing of Colloidal Nanocrystals](#)

[Yanliang Zhang](#)

[1174Thermoelectric Properties of Metal-Organic-Framework Thin Films](#)

[Xin Chen, Kai Zhang, Zeinab Mohamed Hassan, Zhengbang Wang, Pengtao Lin, Helmut Baumgart, Engelbert Redel](#)

[1175Advanced Skutterudite-Based Unicouples for a Proposed Enhanced Multi-Mission Radioisotope Thermoelectric Generator: An Update](#)

[Ike Suchih Chi, Kevin Smith, Chen-Kuo Huang, Samad Firdosy, Kevin Yu, Brian Phan, Sutinee Sujittosakul, Billy Chun-Yip Li, Jong-Ah Paik, Pawan Gogna, Sevan Chanakian, Jennifer Ni, Michell Aranda, Stanley Pinkowski, Terry Hendricks, Jean-Pierre Fleurial, Thierry Caillat](#)

[1176Skutterudite-Based Thermoelectric Technology for Integration into a Proposed Emmrtg for Space Power Applications](#)

[Thierry Caillat, Ike Suchih Chi, Samad Firdosy, Chen-Kuo Huang, Kevin Smith, Kevin Yu, Jennifer Ni, Jong-Ah Paik, Pawan Gogna, Jean-Pierre Fleurial](#)

[1177Calculation of Seebeck Coefficients for Advanced Heat Transfer Modules](#)

Takafumi Tanehira, Yutaka Furubayashi, Atsushi Yamamoto, Kei Yonemori, Seiji Miyoshi, Shin-Ichiro Kuroki

1178(Invited) Atomic Scale Investigations of Extended Crystal Defects in Tetradymite-Structured Thermoelectric Materials

Douglas L. Medlin

1179Thermoelectric Properties & Characterizations of Surmof Thin Films

Xin Chen, Zeinab Mohamed Hassan, Engelbert Redel, Helmut Baumgart

1180(Invited) Thermoelectric Thin Films and Nanocomposites Synthesized Via Solution-Phase Chemistry

Robert Wang

1181(Invited) Durability of Thermoelectric Modules and Development of Generation Systems

Ryoji Funahashi, Tomoyuki Urata, Yoko Matsumura, Miho Suzuki, Hiroyo Murakami, Hitomi Ikenishi, Masataka Kubouchi

1182(Invited) Template Assisted Electrochemical Deposition and High Power Factor Materials for Integrated Thermoelectric Devices

Gabi Schierning, Guodong Li, Vida Barati, David Alberto Lara Ramos, Tom Sieger, Javier Garcia, Nicolas Perez Rodriguez, Melanie Mohn, Heike Schlörb, Jens Freudenberger, Heiko Reith, Kornelius Nielsch

1183High Efficient Thermoelectric Materials with Embedded Nanostructures By Electrochemical Synthesis

Jiwon Kim, Nosang Vincent Myung, Jae-Hong Lim

1184(Invited) Nanostructures for Reduced Lattice Thermal Conductivity — Case Studies for Nanopores and Grain Boundaries

Qing Hao, Dongchao Xu, Yue Xiao, Bo Xiao, Hongbo Zhao

1185(Invited) IV-VI Monochalcogenide Nanostructures: Synthesis, Doping and Thermoelectric Properties

Xuan Gao

1186(Invited) Peltier Effect of Silicon for Cooling 4H-SiC-Based Power Devices

Yutaka Furubayashi, Takafumi Tanehira, Atsushi Yamamoto, Kei Yonemori, Seiji Miyoshi, Shin-Ichiro Kuroki

1187(Invited) Zintl Phase Thermoelectrics: Engineering Transport through Crystal Chemistry

Alexandra Zevalkink

1188In-Plane ZT Measurements of PbTe/PbSe Superlattice Layers Deposited by Atomic Layer Deposition

Xin Chen, Vincent Linseis, Pengtao Lin, Kai Zhang, Helmut Baumgart, Heiko Reith

1189Thermoelectric Characterization of Semiconducting Single-Walled Carbon Nanotubes Extracted By Flavin Compound

Wenxin Huang, Tsuyohiko Fujigaya

1190(Invited) The Electrochemical Impedance Spectra of BiTe Thermoelectric Device

Cian-Tong Lu, Kan-Lin Hsueh, Wen-Jin Li, Chia-Mei Liu

1191Simulation of Thermoelectric Generator Composed of Nanopatterned Thermoelement

Xin Chen, Pengtao Lin, Kai Zhang, Helmut Baumgart

1192Pulsed Laser Deposition of BiCl<sub>3</sub> Doped Bi<sub>2</sub>S<sub>3</sub>/Cu Nanoparticle Composite Films for Thermoelectric Applications

[Tsung-Han Chen, Wei-Yen Chou, Chun-Hua Chen](#)

[1193 Synthesis of P-Type  \$\text{Fe}\_3\text{CoSn}\_x\text{Sb}\_{12-x}\$  Skutterudite Single Phase By Designing Double Filled Compositions](#)

[Soon-Mok Choi, Geonsik Son](#)

## **G05-Oxide Memristors**

[1194 \(Invited\) Resistive States in Strontium Titanate Thin Films](#)

[Markus Kubicek](#)

[1195 \(Invited\) Understanding Resistive Switching in Manganite-Based Memristive Devices](#)

[Mónica Burriel, Dolores Pla, Odette Chaix-Pluchery, Raquel Rodriguez-Lamas, Michel Boudard, Hervé Roussel, Quentin Rafhay, Carmen Jimenez](#)

[1196 Transferable Memristive Nanoribbons Comprising Solution-Processed Strontium Titanate Nanocubes](#)

[Jiaying Wang, Satyan Choudhary, William L. Harrigan, Alfred J. Crosby, Kevin R. Kittilstved, Stephen S. Nonnenmann](#)

[1197 \(Invited\) Volume Resistive Switching in Metallic Perovskite Oxides Driven By the Metal-Insulator Transition](#)

[Anna Palau, Juan Carlos Gonzalez-Rosillo, Rafael Ortega, Julia Jareño, Mariona Coll, B Arndt, Regina Dittmann, Ivan Maggio-Apprile, Jordi Suñé, Xavier Obradors, Teresa Puig](#)

[1198 \(Invited\) Resistive Switching in  \$\text{SrTi}\_x\text{Fe}\_{1-x}\text{O}\_3\$  Solid Solution Thin Films: The Influence of Doping on Memristance Dynamics](#)

[Felix Messerschmitt, Eva Sediva, Maximilian Jansen, Jennifer L.M. Rupp](#)

[1199 Device Asymmetries in  \$\text{SrTiO}\_3\$ -Based Thin Film Resistive Switches: Influence of Humidity and Defects at Interfaces on Memristance](#)



Eva Sediva, William J Bowman, Jennifer L. M. Rupp

1200(Invited) Emulating Neurological and Psychological Functions with Solid State Ionic/Electronic Conductors

Xin Guo

1201(Invited) Fabrication and Characterization of Copper-Silica-Metal Resistive Switching Devices

Wenhao Chen, Arshey Patadia, Michael N Kozicki

1202Observation of Conductive Filament in CBRAM at Switching Moment

Satoshi Muto, Ryota Yonesaka, Atsushi Tsurumaki-Fukuchi, Masashi Arita, Yasuo Takahashi

1203Direct Evidence for the Role of Oxygen Vacancy Configuration for Oxide-Based Resistive Switching Devices

Rafael Schmitt, Jonathan Spring, Roman Korobko, Jennifer L. M. Rupp

1204(Invited) Beyond Electrostatic Effects at Oxide Hetero-Interfaces: Electrochemical Phase Change, Strong Electric Fields, and Elastic Strain

Bilge Yildiz

1205(Invited) Is Ion Migration Needed for Resistance Memory and Memristor?

I-Wei Chen

1206Two Stable Switching Modes with Opposite Polarity in Pt/TiO<sub>2</sub>/Ti Cells Based on Concurring Phenomena Close to the Pt/TiO<sub>2</sub> Interface

Susanne Hoffmann-Eifert, Hehe Zhang, Si Jung Yoo, C. S. Hwang, Camilla La Torre, Stephan Menzel, Dirk Wouters

1207In-Situ Electron Microscopy of Cu Movement in MoO<sub>x</sub>/Al<sub>2</sub>O<sub>3</sub> Bilayer CBRAM during Cyclic Switching Process

Ryusuke Ishikawa, Shuichiro Hirata, Atsushi Tsurumaki-Fukuchi, Masashi Arita, Yasuo Takahashi, Masaki Kudo, Syo Matsumura

1208(Invited) Formation of Conducting Filaments in TaO<sub>x</sub>-Based Resistive Switching Devices

Yuanzhi Ma, Andrew Herzing, Dasheng Li, Noel T. Nuhfer, James A. Bain, Marek Skowronski

1209(Invited) Atomistic Simulations for Understanding Microscopic Mechanism of Amorphous-Tantalum-Oxide-Based Resistive Switching Devices

Satoshi Watanabe, Bo Xiao, Wenwen Li

1210In Operando Characterization of Pt-TaO<sub>x</sub>-Ta Bipolar Vacancy Change Memories

Robin Bay Jacobs-Gedrim, Paul Kotula, William Moyer Mook, Robert James Bondi, Lisa Marie Lowery, Ronald S. Goeke, Carl L. Smith, David R. Hughart, Conrad D. James, Matthew J. Marinella

1211Impact of Embedment of Cu/TaO<sub>x</sub>/Ru on Its Device Performance

Mohammad Al-Mamun, Sean W. King, Marius K Orlowski

1212(Invited) Local Redox Reaction By Ion Transport Probed By in-Situ PES Measurements

Shu Yamaguchi

1213The Role of Oxygen Vacancy Mobility at the Oxide Bulk and Electrode Interfaces for Ceria-Based Memristive Devices

Andreas Nenning, Rafael Schmitt, Roman Korobko, Jennifer L.M. Rupp

1214Short-Term Instability of the Post-Programmed Resistance State in HfO<sub>2</sub>-Based Rram

David Malien Nminibapiel, Dmitry Veksler, Pragya Rasmi Shrestha, Jason P Campbell, Jason T Ryan, Helmut Baumgart, Kin P. Cheung

1215(Invited) Unconventional Computing with Memristors

Dmitri Strukov

1216(Invited) The Non-Volatile Redox Transistor for Neuromorphic Computing

Albert Alec Talin

1217Built-in Nonlinear Characteristics of Low Power Operating One-Resistor Selector-Less RRAM By Stacking Engineering

Ying-Chen Chen, Yao-Feng Chang, Chih-Yang Lin, Xiaohan Wu, Gaobo Xu, Burt Fowler, Ting-Chang Chang, Jack C. Lee

1218(Invited) Epitaxial Random Access Memory (epiRAM) Towards Large-Scale Synaptic Arrays

Jeehwan Kim

1219(Invited) Resistance Switching in Silicon-Rich Silica: Electronic, Structural and Photonic Perspectives

Anthony Joseph Kenyon, Adnan Mehonic, Manveer Munde, Wing Hung Ng, Mark Buckwell, Luca Montesi, Konstantin Zarudnyi, Michel Bosman, Thomas Gerard, Alex L Shluger

1220Design and Application of Strained Interface Heterostructures in Resistive Switching Devices

William J Bowman, Sebastian Schweiger, Reto Pfenninger, Ehsan Izadi, Amith Darbal, Peter A Crozier, Jennifer L. M. Rupp

1221Anodic Oxides As Electrolytes for Resistive Switching Devices

Andrea Zaffora, Francesco Di Quarto, Ilia Valov, Monica Santamaria

[1222Ferroelectric Heterostructures for Synapse Devices](#)

[Taekjib Choi](#)

[1223I-V Characteristics of NiO Nanowire Based Resistive Change Memory](#)

[Kouichi Takase, Takashige Aono, Kosuke Sugawa, Tomohiro Shimizu, Shoso Shingubara](#)

## **H01-State-of-the-Art Program on Compound Semiconductors 60 (SOTAPOCS 60)**

[1224\(Electronics and Photonics Division Award Address\) Compound Semiconductors: A Retrospective](#)

[D. Noel Buckley](#)

[1225\(Keynote\) Perspective on the Development of RF Compound Semiconductors from GaAs to GaN and Beyond](#)

[Paul Saunier](#)

[1226\(Invited\) What's Next after GaN? How about More GaN!](#)

[David J. Meyer, Brian P. Downey, Matthew T. Hardy, David F. Storm, D. Scott Katzer, Mario G. Ancona, Neeraj Nepal, Jason A. Roussos](#)

[1227\(Invited\) Critical Recent Advancement of GaN Technology and MMICs for Millimeter-Wave Applications](#)

[Shuoqi Chen, Larry Witkowski, Xing Gu](#)

[1228\(Invited\) Towards a Si Foundry-Compatible, GaN-on-Si Mmic Process on 200 Mm Si with a Cu Damascene BEOL](#)

[J. Laroche, K. Ip, T. Kennedy, L. Soirez, T. Trimble, T. Kazior](#)

[1229Mercury Selective GaN HEMT Sensor for Dynamic Water Quality Monitoring](#)

[Revathi Sukesan, Yi-Ting Chen, Yu-Lin Wang](#)

1230([Keynote](#)) [Advances in Ga<sub>2</sub>O<sub>3</sub> Processing and Devices](#)

[Jiancheng Yang, Patrick Carey, Shihyun Ahn, Fan Ren, Soohwan Jang, Jihyun Kim, David Hays, Stephen J. Pearton, Akito Kuramata](#)

1231([Invited](#)) [AlGaN-Based PN Diodes for Power Electronics](#)

[Andrew A. Allerman, Mary H. Crawford, Greg W. Pickrell, Andrew M. Armstrong, Robert J. Kaplar, Jeramy R. Dickerson, Brianna Klein, Michael P. King, Michael Van Heukelom](#)

1232([Invited](#)) [Low-Resistance Ohmic Contacts to Al<sub>0.45</sub>Ga<sub>0.55</sub>n/ Al<sub>0.3</sub>Ga<sub>0.7</sub>n HEMTS](#)

[Brianna Klein, Albert G. Baca, Andrew M. Armstrong, Andrew A. Allerman, Erica A. Douglas, Carlos Sanchez, Paul Kotula, Mary Miller, Shahed Reza](#)

1233[Mechanical Exfoliation of Large Area \(100\) β-Ga<sub>2</sub>O<sub>3</sub> Onto Arbitrary Substrates for High Power Devices](#)

[Marko J. Tadjer, Michael A Mastro, Anindya Nath, Lunet E Luna, Travis J Anderson, Karl D Hobart, Akito Kuramata](#)

1234[Surface Analysis of AlGaN Channel Hemts](#)

[Erica A. Douglas, Michael Brumbach, Brianna Klein, Albert G. Baca, Andrew A. Allerman](#)

1235([Keynote](#)) [Accelerating Commercialization of SiC Power Devices through Low-Cost US Manufacturing](#)

[Victor Veliadis](#)

1236([Keynote](#)) [Navy Application of Silicon Carbide \(SiC\) Wide Bandgap \(WBG\) Semiconductors Enabling Future Power and Energy Systems](#)

[Lynn James Petersen](#)

1237(Keynote) Current and Future Directions in Power Electronic Devices and Circuits Based on Wide Band-Gap Semiconductors

Isik C. Kizilyalli, Daniel W Cunningham, Joseph S. Manser, Eric P Carlson

1238(Invited) The Current Status and Future Prospects of SiC Devices

Woongje Sung

1239(Invited) Advances in SiC and GaN Power Device Development and Future Directions

Travis J Anderson, Karl D Hobart, Jennifer K Hite, Lunet E Luna, Francis J Kub

1240(Invited) Thermo-Mechanical Reliability Challenges in the Heterogeneous Integration and Packaging of Wide Bandgap Semiconductors

Tengfei Jiang

1241(Invited) Controlling Materials Defects for SiC Power Devices

Robert E Stahlbush, Nadeemullah A Mahadik

1242Fabrication of Deep 4H-SiC Microstructures Via Inductively Coupled SF<sub>6</sub>/O<sub>2</sub> Plasma

Lunet E Luna, Marko J. Tadjer, Rachael L. Myers-Ward, Travis J Anderson, Karl D Hobart, Francis J Kub

1243(Invited) A Discussion on the Latest Performance of Gan–Based Vertical Devices and the Paths Forward

Srabanti Chowdhury

1244(Invited) Development of III-Nitride Bipolar Transistor Switches and Rectifiers

Shyh-Chiang Shen, Russell D Dupuis, Theeradetch Detchprohm, Jae-Hyun Ryou,

[Jobitron Bill Chaiyasarikul, Mi-Hee Ji, Tsung-Ting Kao, Yi-Che Lee, Zachary Lochner, Jeomoh Kim](#)

1245 [\(Invited\) Vertical GaN Devices Enabled By Selective Area P-Type Doping](#)

[Andrew D. Koehler, Travis J Anderson, Anindya Nath, Alan G Jacobs, Marko J. Tadjer, Boris Feigelson, Mark S. Goorsky, Karl D Hobart, Francis J Kub](#)

1246 [Bi-Parabolic Graded Buffer Layers for Metamorphic Devices](#)

[Yifei Song, Tedi Kujofsa, John E Ayers](#)

1247 [Comparison of Chirped Superlattices and Linearly-Graded Buffer Layers As Adjustable-Strain Platforms for Metamorphic InAaAs/GaAs \(001\) Devices](#)

[Xinkang Chen, Md Tanvirul Islam, Tedi Kujofsa, John E Ayers](#)

1248 [Investigation of Ingaas-Based Pin Photodiode for High Quantum Efficiency](#)

[Hwa Sub Oh, Jong Min Park, Sung Hoon Jung, Dong Wook Lee, Kang Seok Lee](#)

1249 [\(Invited\) Engineering Metal Oxide Semiconductors for Flexible Electronics](#)

[Rodrigo Martins](#)

1250 [III-Nitride Epitaxy for Electronic and Optoelectronic Devices](#)

[F. Shadi Shahedipour-Sandvik, Isra Mahaboob, Jonathan Marini, Kasey Hogan, Emma Rocco](#)

1251 [\(Invited\) Growth and Characterization of Bulk Hype-GaN. Pathway to Highly Conductive and Semi-Insulating GaN Substrates](#)

[Michal Bockowski](#)

1252 [\(Invited\) GaN-Based Device Reliability Investigations through Advanced TEM Techniques](#)

[Petra Specht, Travis J Anderson, Andrew D. Koehler, Oscar D Dubon, Todd R Weatherford](#)

1253([Invited](#)) [Atom Probe Tomography of 1D, 2D and 3D Semiconductors](#)

[Patrick Kung, Joseph L Waters, Sourav Garg, Seongsin M Kim](#)

1254[Efficient Band-to-Trap Tunneling Model Including Heterojunction Band Offset](#)

[Xujiao Gao, Andy Huang, Bert Kerr](#)

1255[Numerical Model of Three-Step Mechanism of Pore Formation in n-InP](#)

[Ian Clancy, Nathan Quill, Colm O'Dwyer, D. Noel Buckley, Robert P. Lynch](#)

1256([Invited](#)) [2D Materials: Large Scale Synthesis, Doping, and Transport](#)

[Joshua A Robinson](#)

1257([Invited](#)) [Bottom up Synthesis of Few-Layer Van-Der Waals Heterostructures on Multifarious Semiconducting Substrates](#)

[Luke O. Nyakiti, Jennifer K Hite, Zachary Robinson, Karthik Sridhara, Rachael L. Myers-Ward, Marc Currie, Charles R Eddy, Jr., Kurt Gaskill](#)

1258([Invited](#)) [Optoelectronic Components Based on Semiconducting Transition Metal Dichalcogenides](#)

[Luis Balicas](#)

1259([Invited](#)) [Novel Electronic Transport in Topological Semimetals](#)

[Wenlong Yu, Yuxuan Jiang, Jeremy Yang, Zhiling Dun, Haidong Zhou, Zhigang Jiang, Ping Lu, Wei Pan](#)

1260([Invited](#)) [Dirac Fermions in Layered Topological Material ZrTe<sub>5</sub>](#)



[Zhigang Jiang, Yuxuan Jiang, Dmitry Smirnov](#)

[1261\(Invited\) Scalable Planar Fabrication Processes for Chalcogenide-Based Topological Insulators](#)

[Peter A. Sharma, Michael David Henry, Erica A. Douglas, Ana Lima Sharma, Rupert Lewis, Joshua D Sugar, Nikesh Koirala, Maryam Salehi, Seonshik Oh](#)

## **H02-Low-Dimensional Nanoscale Electronic and Photonic Devices 10**

[1262\(Invited\) Efficient MoS<sub>2</sub> Catalyst Integrated on Si Heterojunction Cell for Photoelectrochemical Hydrogen Evolution](#)

[Jr Hau He, Abeer Ateeq Alarawi, Purushothaman Varadhan](#)

[1263\(Invited\) Van Der Waals Heterojunctions for Energy-Efficient Electronics](#)

[Tania Roy](#)

[1264\(Invited\) 2-Dimensional Layered Materials for Si Technology](#)

[Hyeon-Jin Shin](#)

[1265\(Invited\) Transition Metal Dichalcogenide Semiconductor Growth and Large Area Devices for Optoelectronics and Sensing](#)

[Sourav Garg, Abu Shahab Mollah, Joseph L Waters, Seongsin M Kim, Patrick Kung](#)

[1266\(Invited\) Designing Symmetric and Asymmetric Morphology in Silicon Nanowires to Encode Advanced Electronic and Photonic Functionality](#)

[James F Cahoon](#)

[1267\(Invited\) The Effects of Zinc-Tin-Oxide Nanosphere Monolayer on Improvement of Light Extraction in Light-Emitting Diodes](#)

[Taek Gon Kim, Dong Su Shin, Do Hyun Kim, Jinsub Park](#)

[1268\(Invited\) Growth, Optical, and Mechanical Properties Investigations of AlN Nanowires and Nanohelices](#)

[Bo Song, Jiecai Han](#)

[1269\(Invited\) Towards the Realization of Bulk Dynamic Strain By Vertically Aligned VO<sub>2</sub> Nanowire Hybrid Arrays](#)

[Yiping Wang, Jian Shi](#)

[1270\(Invited\) Silicon Nanopillars Coated with Earth-Abundant Electrocatalysts for Enhanced Photoelectrochemical Hydrogen Production](#)

[Xingwang Zhang, Chunlin Yu, Qing Jia](#)

[1271\(Invited\) In Situ Electron Beam Driven Nano-Devices – a Route to New Materials Development for Energy Applications and Beyond](#)

[Mark Hermann Rummeli](#)

[1272\(Invited\) Orientation Dependent GaAs Nanowire Schottky Solar Cells with 16% Efficiency](#)

[Ning Han, Johnny C Ho](#)

[1273\(Invited\) Cost-Effective Fabrication of Nanostructured Electrodes for High-Performance Flexible Supercapacitors](#)

[Zhiyong Fan, Yuanjing Lin](#)

[1274Bifacial Micropyramidal Surface for Achieving High Efficiency of Photoelectrochemical Water Splitting](#)

[Hui-Chun Fu, Purushothaman Varadhan, Meng-Lin Tsai, Wenjie Li, Qi Ding, Song Jin, Jr-Hau He](#)

[1275\(Invited\) All-Solid-State Batteries: Status and Perspectives](#)

[Ruben-Simon Kühnel, Arndt Remhof, Corsin Battaglia](#)

1276([Invited](#)) [Multi-Shelled V<sub>2</sub>O<sub>5</sub> Hollow Microspheres Synthesized through Anions-Adsorption for High-Rate Lithium-Ion Batteries](#)

[Jiangyan Wang, Dan Wang](#)

1277([Invited](#)) [Eco-Friendly Nanogenerator and Active Sensor](#)

[Jyh Ming Wu](#)

1278([Invited](#)) [Kinematically Driven Triboelectric Nanogenerator As a Practical Power Source](#)

[Divij Bhatia, Dukhyun Choi](#)

1279([Invited](#)) [Improving Triboelectric Nanogenerator Performance Using AAO and Nanopatterned PDMS](#)

[Nghia Dinh Huynh, Dukhyun Choi](#)

1280([Invited](#)) [Molecularly Tunable Quantum Emitters](#)

[YuHuang Wang](#)

1281([Invited](#)) [Controllable Growth of High-Performance Gasb Thin Nanowires By a Surfactant Assisted CVD Process](#)

[Zaixing Yang](#)

1282([Invited](#)) [Challenges to Implement Resistive Memory Cells in the CMOS BEOL](#)

[Mohammad Al-Mamun, Marius K Orlowski](#)

1283([Invited](#)) [Band Gap Engineering and Optoelectronic Performance of Indium Gallium Arsenide Nanobelts](#)

[Xuehong Zhang, Tiefeng Yang, Anlian Pan](#)

[1284\(Invited\) 2D Materials Synthesis: It's All about the Substrate](#)

[Joshua A Robinson](#)

[1285\(Invited\) Phase and Stacking of 2D Materials in Heterostructures and Dislocated Nanoplates Impact Their Properties and Applications](#)

[Song Jin](#)

[1286\(Invited\) Investigation of Single WS<sub>2</sub> Nanotubes Leads to New Observations and Potential Applications](#)

[Reshef Tenne](#)

[1287\(Invited\) Low-Temperature Growth of Two-Dimensional Layered Materials Toward Phase-Engineered Hybrid Films](#)

[Yu-Lun Chueh](#)

[1288\(Invited\) Manipulating Electronic Transport Properties of III-V Nanowire Transistor](#)

[Fengyun Wang, Ning Han, Ho-Yuen Cheung, Johnny C. Ho](#)

[1289\(Invited\) Performance Improvement of Silver-Nanowire-Based Flexible Transparent Electrodes By Capillary-Force-Induced Cold Welding](#)

[Yuan Liu, Zhifeng Ren, Chuan-Fei Guo](#)

[1290\(Invited\) Colloidal Perovskite Quantum Wells for High-Color-Purity Optoelectronics](#)

[Chih-Jen Shih](#)

[1291Heavily-Doped SOI with SAM-Based Gate Dielectrics in Application to TMDC FETs](#)

[Ryo Ikoma, Takamasa Kawanago](#)

[1292Enhanced Visible Light Absorption of MoS<sub>\(2-x\)</sub>/TiO<sub>2</sub>/Ti Multilayered Heterojunction Photoelectrode](#)

[Chaoqun Cheng, Kang Du, Gang Li, Kaiying Wang](#)

[1293Optimizing a Long-Range Highly Ordered Plasmonic Nanoarray Pattern for Surface-Enhanced Raman Scattering](#)

[Sujan Kasani, Peng Zheng, Nick Wu](#)

[1294Synthesis and Optoelectronic Performance of III-V Nanowires](#)

[Xuehong Zhang, Anlian Pan](#)

[1295\(Invited\) Electronic and Chemical Structure of 2D Materials](#)

[Sujitra Pookpanratana](#)

[1296\(Invited\) Solution-Processed Charge Transfer Doping of Transition-Metal Dichalcogenides \(TMDs\) with Redox-Active Molecules](#)

[Siyuan Zhang, Christina A. Hacker, Sujitra Pookpanratana](#)

[1297\(Invited\) Ion Intercalation and High Temperature Behavior of 2D Materials](#)

[Liangbing Hu](#)

[1298\(Invited\) Overview of ALD Synthesized MoS<sub>2</sub> Thin Films](#)

[Helmut Baumgart, Min Zeng, Kai Zhang, Xin Chen, Pengtao Lin, Qiliang Li](#)

[1299Enhanced Piezoelectric Property in Strained Anisotropic Layered Tungsten Ditelluride Nanoflowers](#)

[Srinivaas Masimukku, Jyh Ming Wu](#)

[1300Performance Enhancement of WTe<sub>2</sub> Devices By h-BN Encapsulation](#)

Minghu Pan, Hui Yuan, Yue Zhao

1301(Invited) Enhanced Self-Assembly of Crystalline, Large-Area and Periodicity-Tunable TiO<sub>2</sub> Nanotube Arrays on Various Substrates for Technological Applications

Johnny C. Ho

1302(Invited) SURMOFs and CCNCs As Novel Tuneable Materials for Electronic Devices and Applications

Engelbert Redel

1303(Invited) Crystalline Electronic and Photonic Materials Grown on Non-Epitaxial Substrates

Rehan Kapadia, Debarghya Sarkar, Wei Wang

1304(Invited) Semiconducting Polymer-Semiconducting Single-Walled Carbon Nanotubes Hybrid Nanocomposites

Dennis Lee, Geonhee Park, Hyeon-Jin Shin, Woo-Jae Kim

1305(Invited) Novel Nanophotonic Devices By Engineering Light-Matter Interactions in Low-Dimensional Systems

Ritesh Agarwal

1306(Invited) Incommensurate Epitaxy of Low-Dimensional Metal Halides

Jian Shi

1307(Invited) Band Gap Engineering and Heterostructures of Low Dimensional Semiconductors

Tiefeng Yang, Xuehong Zhang, Anlian Pan

1308(Invited) Orthogonal E-Beam Lithography Approach on 2D Organic-Inorganic Halide Perovskites

[Chun-Ho Lin, Bin Cheng, Ting-You Li, José Ramón Durán Retamal, Jr-Hau He](#)

[1309\(Invited\) Increasing the Bandwidth of Semiconductor Photodetectors through Hot Carrier Generation in Nanometer-Scale Optical Coatings](#)

[Lisa J Krayner, Jeremy N Munday](#)

[1310\(Invited\) Hyperbolic Metamaterials and Their Imaging, Lasing, Sensing Applications](#)

[Junsuk Rho](#)

[1311\(Invited\) Welding of Nickel Nanowires By Ions Beam Irradiation: From Small to Large Scale](#)

[Shehla Honey, Ishaq Ahmad, Shahzad Naseem, Maaza Malik, Kennedy John](#)

[1312\(Invited\) Guided Nanowire Optoelectronics](#)

[Ernesto Joselevich](#)

[1313Comprehensive Modeling and Simulation of the Effects of Surface Defects on Graphene Chemical Sensors](#)

[Aaron Lowenberger, Qiliang Li](#)

### **H03-Gallium Nitride and Silicon Carbide Power Technologies 7**

[1314\(Invited\) Challenges the UWBG Semiconductors AlGaN, Diamond, and Ga<sub>2</sub>O<sub>3</sub> Must Master to Compete with SiC and GaN HPE Devices](#)

[Kenneth A. Jones, R. P. Tompkins, M. B. Graziano, M. A. Derenge](#)

[1315\(Invited\) 650 Volt GaN Commercialization Reaches Automotive Standards](#)

[Primit Parikh, Kurt Smith, Ron Barr, Ken Shono, J. McKay, Likun Shen, R. Lal, S. Chowdhury, S. Yea, R. P. Smith, T. Hosoda, J. Gritters, L. McCarthy, R. Birkhahn, K.](#)

Imanishi, B. Swenson, M. Moore, Y. Kotani, T. Ogino, N. Bushnell, J. Guerrero, H. Clement, Y. Asai, YiFeng Wu

1316(Invited) Material Considerations for the Development of III-Nitride Power Devices

Biplab Sarkar, Pramod Reddy, Felix Kaess, Brian Haidet, James Tweedie, Seiji Mita, Ronny Kirste, Erhard Kohn, Ramon Collazo, Zlatko Sitar

1317Recent Progress in SiC and GaN Power Devices

Kuang Sheng, Shu Yang, Qing Guo, Hongyi Xu

1318(Invited) Rectifiers, Mos Diodes and LEDs Made of Fully Porous GaN Produced by Chemical Vapor Deposition

Joan J. Carvajal, Josue Mena, Jordi Aixart, Francesc Díaz, Magdalena Aguiló

1319(Invited) Fabrication of AlGaIn/InGaIn/GaN Quantum Wires for Electronic and Optoelectronic Applications

Mike Leszczynski, Marcin Sarzynski, Ewa Grzanka, Robert Czernecki, Julita Smalc Koziorowska, Jarek Domagala

1320(Invited) Simulation Study of High Voltage Vertical GaN Nanowire Field Effect Transistors

Gourab Sabui, Vitaly Z. Zubialevich, Pietro Pampili, Mary White, Peter J. Parbrook, Mathew McLaren, Miryam Arredondo-Arechavala, Z. John Shen

1321(Invited) SiC MOSFET Reliability and Implications for Qualification Testing

Aivars Lelis, Ron Green, Dan Habersat

1322(Invited) Requirements for Highly Accurate Multiphysics Modeling of SiC Power MOSFETs and Power Modules

Ulrike Grossner, Bhagyalakshmi Kakarla, Thomas Ziemann, Johanna Muting, R. Stark, Ivana Kovacevic-Badstuebner



[1323\(Invited\) Thermal Stability of  \$1 \times 10^{20} \text{ cm}^{-3} \text{ Al}^+\$  Implanted 4H-SiC after Electrical Activation at Temperature  \$\geq 1850^\circ\text{C}\$](#)

[Roberta Nipoti, Mariaconcetta Canino, Maurizio Puzanghera, Giovanna Sozzi](#)

[1324\(Invited\) Material Challenges in Low Offcut Substrates for High Power SiC Devices](#)

[Rachael L. Myers-Ward, C Martin, Nadeemullah A Mahadik, Robert Stahlbush, Paul Klein, Kevin Daniels, Anthony Boyd, Charles R. Eddy, D. Kurt Gaskill](#)

[1325\(Invited\) Growth, Defects and Doping of 3C-SiC on Hexagonal Polytypes](#)

[Rositsa Yakimova, Ivan G. Ivanov, Lasse Vines, Margareta Linnarsson, Andreas Gällström, Filippo Giannazzo, Fabrizio Roccaforte, Peter Wellmann, Mikael Syväjärvi, Valdas Jokubavicius](#)

[1326Ni-Al-Ti Ohmic Contacts on  \$1 \times 10^{20} \text{ cm}^{-3} \text{ Al}^+\$  Ion Implanted 4H-SiC](#)

[Roberta Nipoti, Maurizio Puzanghera, Mariaconcetta Canino, Giovanna Sozzi](#)

[1327Difference of Near-Interface SiO<sub>2</sub> Structures between O<sub>2</sub>-Oxidation and H<sub>2</sub>O-Oxidation of 4H-SiC \(0001\) and Its Impact on MOS Interface Characteristics](#)

[Koji Kita, Hirohisa Hirai, Kei Ishinoda](#)

[1328\(Invited\) GaN Wafers with Dramatically Improved Crystalline and Electrical Properties](#)

[Jaime A. Freitas, James C Culbertson, Nadeemullah A Mahadik, Marko J. Tadjer, Tomasz Sochacki, Michal Bockowski](#)

[1329Effect of Wafer and Damaged Layer Thickness on Residual Stress and Bow of Free-Standing Gallium Nitride Wafers during Wafering Process](#)

[Jin-Seong Park, Jae-Hyoung Shim, Kyung-Bin Chun, Jae-Eon Lee, Tae-Hun Shim, Jeon-Gun Park](#)

[1330 Thermal Evolution of Implantation Damages in Mg-Implanted GaN Layers Grown on Si](#)

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[1332 \(Invited\) Achieving Vertical Trench-Gate GaN MOSFETs via Process Optimization](#)

[David I Shahin, Travis J Anderson, Aristos Christou](#)

[1333 \(Invited\) New Approaches for Shrinking the Performance Gap for GaN Power Devices](#)

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[1334 \(Invited\) ScAlN: A Novel Barrier Material for High Power GaN-Based RF Transistors](#)

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[1335 GaN Lateral High Voltage Photoconductive Semiconductor Switches](#)

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[1336 Sensitivity of Breakdown Voltage of Power Transistors to Dopant Impurities](#)

[Chen Zhu, Petru Andrei](#)

[1337 \(Invited\) Three-Section Adjusted Field Limited Rings Applicable for SiC 2200V Power MOSFETs](#)

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1338(Invited) Ultra-Wide-Bandgap Aluminum Gallium Nitride Power Switching Devices

Robert J. Kaplar, Andrew A. Allerman, Andrew M. Armstrong, Mary H. Crawford, Greg W. Pickrell, Jeramy R. Dickerson, Jack D. Flicker, Michael P. King, Karen C. Cross, Caleb E. Glaser, Michael Van Heukelom, Albert G. Baca, Shahed Reza, Brianna Klein, Erica A. Douglas

1339(Invited) Growth and Characterization of  $\alpha$ -,  $\beta$ -, and  $\epsilon$ -Ga<sub>2</sub>O<sub>3</sub> Epitaxial Layers on Sapphire

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1340(Invited) High Power Diamond Devices with 2-D Transport Channels

David I Shahin, Aristos Christou, James E Butler

1341(Invited) Ultrawide Bandgap  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> Thin Films: Growths, Properties and Devices

Subrina Rafique, Lu Han, Hongping Zhao

1342(Invited) Progress and Challenges of AlGaN Schottky Diodes Grown on AlN Substrates

Rafael Dalmau, Hughes Spalding Craft, Raoul Schlessler, Seiji Mita, Joseph Smart, Collin Hitchcock, Gyanesh Pandey, Tat-Sing Paul Chow, Baxter Moody

1343(Invited) UVPL Imaging of 4H-SiC Wafers Along the Device Processing Chain

Birgit Kallinger, Daniel Kaminzky, Francis Edokam, Patrick Berwian, Jochen Friedrich, Johannes Schöck, Anton Bauer

1344(Invited) Non-Destructive Three-Dimensional Imaging of Extended Defects in 4H-SiC

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[1345 Classification of Killer and Non-Killer Silicon Carbide Epitaxial Defects and Accurate Prediction of Device Yield](#)

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[1347 \(Invited\) Novel Implantation Processing and Characterization for Scalable GaN Power Devices](#)

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[Andrew David Findlay, Marshall Wilson, Alexandre Savtchouk, John D'Amico, Jacek Lagowski, Robert Hillard](#)

[1349 Studies on Doping Concentration Variations in 4H-SiC Substrates Using X-ray Contour Mapping](#)

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1352[Characterization of High Temperature PEM Fuel Cells for Electrochemical Hydrogen Pumping](#)

[Michael A. Schmid, Samuele Galbiati, Nico Bevilacqua, Stefan Schindler, Michael A. Danzer, Jürgen Kaczerowski, Roswitha Zeis](#)

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[1360A Pore Network Modelling Study of Fuel Cell Gas Diffusion Layers with Patterned Wettability](#)

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[1361Multiscale Numerical Model for Contact Resistance Prediction in the Proton Exchange Membrane Fuel Cell](#)

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[1362PGM-Free Electrode Microstructure Analysis and Transport Modeling](#)

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[1363Measurement Technique of Effective Oxygen Diffusion-Coefficient of Water-Containing Gas Diffusion Layers](#)

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[1365Effects of GDL Compression on SGL Binder](#)

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[1366On the Limitations of Volume-Averaged Descriptions of Gas Diffusion Layers in the Modeling of Polymer Electrolyte Fuel Cells](#)

[Pablo A. García-Salaberri, Jeff T. Gostick, Iryna V. Zenyuk, Gisuk Hwang, Marcos Vera, Adam Z. Weber](#)

1367 [Evaporation of Water from Gas Diffusion Layers](#)

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1369 [The Impacts of Microporous Layer Degradation on Liquid Water Distributions in Polymer Electrolyte Membrane Fuel Cells Using Synchrotron Imaging](#)

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1370 [Impact of Microporous Layer Properties for High Current Density Operation](#)

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1373 [Numerical Predicting of Liquid Water Transport inside Gas Diffusion Layer for PEMFC Using Lattice Boltzmann Method](#)

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[1374\(Invited\) Microstructural Modeling of PEFC Catalyst Layer Performance and Durability](#)

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[1375Improvement of Porous Structure of PEFC Catalyst Layer with Silica Pt/C By Inkjet Method](#)

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[1376Ionomer Binder-Dependent Degradation Behavior of Cathode Catalyst Layers in PEFCs](#)

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[1378Experimental Evaluation of Dominant Transport Resistances of Oxygen in Catalyst Layers of PEFC](#)

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[1379Performance Changes in Stratified Fuel Cell Catalyst Layer with Ultra-Thin Membranes](#)

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[1381 Controlling the Polymer/Gas Interfacial Property of the Ionic Polymer Phase of a PEM Fuel Cell Catalyst Layer during Membrane Electrode Assembly Fabrication](#)

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[1383 Novel Fuel Cell MEA Based on Pt-C Deposited by Magnetron Sputtering](#)

[Anna Ostroverkh, Viktor Johaneck, Martin Dubau, Peter Kus, Katerina Veltruska, Michal Vaclavu, Roman Fiala, Bretislav Smid, Yevhenii Ostroverkh, Vladimir Matolin](#)

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[Miho Kageyama, Yusaku Makino, Kazuhiro Yamaguchi, Motoaki Kawase](#)

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[1389 Understanding Binary Interactions and Aging Effects in Catalyst Layer Inks for Controlled Manufacturing](#)

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[1391 Transport Resistances in Fuel-Cell Catalyst Layers](#)

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[1394 \(Invited\) Methods for Understanding and Mitigating High Current Density Performance Losses in Low Loaded Pt-Based PEMFCs](#)

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[1396 Oxygen Partial Pressure on the GDL Surface under the Single-Serpentine Flow Channel and the Ribs in a Running PEFC](#)

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1399[On-Board Control System of Water Content inside FCV Stack by Electrochemical Impedance Spectroscopy](#)

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1400[Development of a Common Differential Fuel Cell Test Fixture and Protocols to Expedite Material Development](#)

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1401[Optimizing the Interface of a Bipolar Membrane Fuel Cell: An Experimental Study](#)

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1402[An Economical Half-Cell and Modified Rotating Disk Electrode for Electrochemical Characterizations of Fuel Cell Catalyst-Coated Membranes and Gas Diffusion Electrodes](#)

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1403[Determining Water Content and Distribution in PEMFCs to Predict Aging While in Storage](#)

[Sarah Stariha, Mahlon S. Wilson, Jacob M LaManna, David L Jacobson, Daniel S Hussey, Natalie Macauley, Jon Rau, Rod L. Borup](#)

[1404\(Invited\) In Situ/Operando Characterization of Electrocatalysts Using Ambient Pressure XPS](#)

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[1405Advances in Structural Characterization Using Soft X-ray Scanning Transmission Microscopy \(STXM\): Mapping and Measuring Porosity in PEM-FC Catalyst Layers](#)

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[1406Nanostructural Evolution during Catalyst Layer Formation Studied via Cryo-Electron Microscopy](#)

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[Nelly M. Cantillo, Luyue Li, Jing Peng, Gabriel A. Goenaga, Thomas A. Zawodzinski](#)

[1408Electron Microscopy Observations of Catalyst-Support Interactions in Polymer Electrolyte Membrane Fuel Cells](#)

[David A. Cullen, Brian Sneed, Gang Wu, Jacob S Spendelow, Hoon T Chung, Piotr Zelenay, Karren L. More](#)

[1409Time-Resolved Nanostructural Analysis of Catalyst Layer Formation Process by Synchrotron X-ray Scattering](#)

[Yuichi Konosu, Maito Koga, Hidetoshi Matsumoto, Masatoshi Tokita, Hiroyasu Masunaga, Takaaki Hikima, Hidekazu Sugimori, Toshihiko Yoshida, Kazuhiko Shinohara, Shuichiro Hirai](#)

[1410Quantitative Mapping of Ionomer in Catalyst Layers by Electron and X-ray Spectromicroscopy](#)

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1411 [Oxygen Transport Effects of Cobalt Cation Contamination of Ionomer Thin Films in Proton Exchange Membrane Fuel Cells](#)

[Jonathan Braaten, Anusorn Kongkanand, Shawn Litster](#)

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1413 [An Effect of Mass Transport and Pt Oxide Formation on High Current Density Performance in PEFC](#)

[Nobuhisa Ikeda, Yuichiro Tabuchi, Takuma Isobe](#)

1414 [Measurement of Mechanical Behavior of Pristine Fuel Cell Electrodes Using Water Surface](#)

[Sanwi Kim, Jae-Han Kim, Jong-Gil Oh, Kyung-Lim Jang, Byeong-Heon Jeong, Bo Ki Hong, Taek-Soo Kim](#)

1415 [Understanding N-Functionalized Carbon-Based Catalysts and Supports Via Atom Probe Tomography and Electron Microscopy](#)

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1416 [\(Invited\) Experimental and Physically Based Modelling Analysis of Electrochemical Impedance in PEMFC to Interpret Performance Degradation Causes](#)

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1417 [Development of Numerical Models for Simulations of Transient Internal States of PEFC Stack System](#)

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[1421 Characterization of Water Transport in PEMFC Electrode Using the Washburn Method](#)

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[1422 A 1D+1D Model of Direct Ethanol Fuel Cells Based on an Optimized Kinetic Mechanism for Ethanol Electro-Oxidation Involving Free and Adsorbed Intermediate Species](#)

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[1423 A 2D through-the-Membrane Transient Model for Polymer Electrolyte Membrane Fuel Cells](#)

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[1426 Membrane/Electrode Assembly Water Content Measured with 2  \$\mu\text{m}\$  Spatial Resolution Neutron Imaging](#)

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[1427 Visualization of Water in Fuel Cell Gas Diffusion Layers By Neutron Dark Field Imaging](#)

[Muriel Siegwart, Victoria Manzi-Orezzoli, Ralph Harti, Jacopo Valsecchi, Christian Gruenzweig, Thomas J. Schmidt, Pierre Boillat](#)

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1434 [Analysis of Ionomer Distribution in Catalyst Layers by Two-Stage Ion-Beam Processing](#)

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[1443Influence of Cathode Catalyst Layer Ionomer on Air-Cooled, Open-Cathode Fuel Cells](#)

[Robert W. Atkinson, Yannick Garsany, Joseph A. Rodgers, Matthew W. Hazard, Richard O'Neil Stroman, Benjamin D. Gould](#)

[1444\(Invited\) Cell Performance Analysis of Redox Flow Fuel Cells with Pt-Free Cathode](#)

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[1445\(Invited\) Performance Evaluation of a Hybrid Hydrogen-Vanadium Reversible Fuel Cell](#)

[Trung Van Nguyen, Regis Paul Dowd, Devon Powers, Ryszard Wycisk, Peter N Pintauro](#)

[1446\(Invited\) Direct Formic Acid Fuel Cells Anode Optimization: Flow Fields and Catalysts](#)

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[1447Conflicting Roles of Nitrogen Doping in Carbon Nanotubes As Anode and Cathode Catalyst Support for Direct Methanol Fuel Cells](#)

[Lin Gan, Hongda Du, Ruitao Lv, Jia Li](#)

1448[Effects of Copper Corrosion in the Performance of Polymer Electrolyte Membrane Fuel Cells](#)

[N Allwyn Blessing Johnson, Sarit Kumar Das, Ashis Kumar Sen](#)

1449[Strategies for Effective Utilization of Hydrogen in Cylindrical PEM Fuel Cells](#)

[S R Suseendiran, Samuel Pearn-Rowe, Raghunathan Rengaswamy](#)

1450[Direct Formic Acid Fuel Cell: Anode Flow Field Designed Two-Phase Removal of Carbon Dioxide](#)

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1451[Energy Balance of an Photovoltaic/Fuel Cell Integrated Energy System](#)

[Kan-Lin Hsueh, Fu-Pin Ting, Chun-I Lee, Wen-Sheng Chang](#)

1452[Performance Improvement By Introduction of Macropore Structure in Membrane Electrolyte Assembly Using Mechanical Properties of Polymer Electrolyte Membrane](#)

[Chi-Yeong Ahn, Sungjun Kim, Wonchan Hwang, Yong-Hun Cho, Yung-Eun Sung](#)

1453[Development of 200W Class Direct Formic Acid Fuel Cell Stack Using Bi-Modified Pt/C Catalyst By Irreversible Adsorption](#)

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1454[Durability Improvement of Pt Shell-Pd Core Structured Catalyst Via Poly-Dopamine Coating](#)

[Hideo Daimon, Shunya Higuchi, Yuki Matsui, Hisashi Kawasaki, Yui Noguchi, Takayuki Doi, Minoru Inaba](#)

1455[Comprehensive Understanding of Electrode Processes in PEMFCs Exposed to Various Pollutants Using Spatial AC-Impedance Spectroscopy](#)

[Tatyana V. Reshetenko](#)

1456[The Influence of CO on Hydrogen Evolution](#)

[Charles Joseph Banas, Leonard J. Bonville, Ugur Pasaogullari, Trent M. Molter](#)

1457[Effects of a Co-Reactant Redox Behavior on the AC Impedance Response of the ORR](#)

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1458(Invited) [Review: PEMFC Materials' Thermal Conductivity and Influence on Internal Temperature Profiles](#)

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[Shohei Matsumoto, Masaru Nagamine, Zhiyun Noda, Junko Matsuda, Akari Hayashi, Kazunari Sasaki](#)

1582 [Stable Electrocatalysts Based on Potential-Dependent Switching of Metal Oxide Support Conductivity](#)

[Tobias Binniger, Rhiyaad Mohamed, Alexandra Patru, Emiliana Fabbri, Armin Hoell, Thomas J. Schmidt](#)

1583 [Titanium Oxide-Supported Electrocatalysts for Polymer Electrolyte Fuel Cells](#)

[Tsutomu Ioroi](#)

1584 [Catalytic Activity and Durability of Platinum Supported on Titanium Oxide Nanoparticles for Proton Exchange Membrane Fuel Cells](#)

[Gholamreza Mirshekari, Pezhman Shirvastian](#)

1585 [Functionalized TiO<sub>2</sub> Supported Pt Nanocatalysts for Oxygen Reduction Reaction in PEMFCs](#)

[Bing Joe Hwang, Wei-Nien Su, Bing-Jen Shieh, Mon-Che Tsai](#)

1586 [Pt-Ni/WC Alloy Nanorods Arrays as ORR Catalyst for PEM Fuel Cells](#)

[Mahbuba Begum, Mesut Yurukcu, Fatma Yurtsever, Busra Ergul, Nancy Kariuki, Deborah J Myers, Tansel Karabacak](#)

1587 [\(Invited\) Analyses of CO Tolerance at Stabilized Pt-Skin/Ptfe and PtCo Hydrogen Anode Catalysts with High Activity and Robustness for Residential PEFCs](#)

[Hiroshi Yano, Guoyu Shi, Yoshiyuki Ogihara, Donald A. Tryk, Akihiro Iiyama, Hiroyuki Uchida](#)

1588 [Anode Aging through Voltage Cycling Induced by H<sub>2</sub>-Air Fronts during System Start-Up and Shut-Down](#)

[Jan Nicolas Schwämmlein, Philipp J. Rheinländer, Yongsheng Chen, Katharina Tabitha Freyer, Hubert A. Gasteiger](#)

1589[X-Ray Absorption Study of Sputtered Pt-CeO<sub>2</sub> Catalyst Used in PEM-FC](#)

[Roman Fiala, Jakub Drnec, Michal Vaclavu, Vladimir Matolin](#)

1590[Palladium Alloy Based Nanocomposite as an Efficient Anode and Cathode Electrocatalyst for Polymer Electrolyte Membrane Fuel Cell](#)

[Priji C, Ramaprabhu S](#)

### **I01E-Polymer Electrolyte Fuel Cells 17 (PEFC 17) - Materials for Alkaline Fuel Cells and Direct-Fuel Fuel Cells**

1591[\(Invited\) Molecular Engineering of Aromatic Polymer Electrolytes for Anion Exchange Membranes](#)

[Woo-Hyung Lee, Eun Joo Park, Junyoung Han, Jong Yeob Jeon, Angela D Mohanty, Dong Won Shin, Yu Seung Kim, Chulsung Bae](#)

1592[Imidazolium-Functionalized Polymer Membranes for Fuel Cells and Electrolyzers](#)

[Mark Pellerite, Marina Kaplun, Claire Hartmann-Thompson, Krzysztof A. Lewinski, Nancy Kunz, Travis Gregar, John Baetzold, Dale Lutz, Matthew Quast, Zengcai Liu, Hongzhou Yang, Syed D. Sajjad, Yan Gao, Rich Masel](#)

1593[Anion Conducting Block Copolymers with Partial Fluorination and Long Side Chains](#)

[Mrinmay Mandal, Lisha Liu, John M. Ahlfield, Paul A Kohl](#)

1594[The ARPA-E Ionics Program: Advancing Anion Exchange Membranes](#)

[Paul S. Albertus, Susan J. Babinec, Mark J. Pouy](#)

1595[Multiplex Analysis on Phase Separation and Ion Conductivity at Bulks and Surfaces of Designed Anion Exchange Membranes](#)

[Taro Kimura, Ryo Akiyama, Kenji Miyatake, Junji Inukai](#)

1596 [Anion Conducting Ionomers for Fuel Cell and Electrolyzer Applications](#)

[Garrett Huang, Lisha Liu, John M. Ahlfield, Yunbum Kim, Yuna Kaburagi, Andrew Tricker, Paul A Kohl](#)

1597 [Synthesis and Characterization of Perfluorinated Anion Exchange Membranes](#)

[Andrew Michael Park, Zbyslaw R. Owczarczyk, L. E. Garner, Ami C. Yang-Neyerlin, Hai Long, C. M. Antunes, Matthew R Sturgeon, M. J. Lindell, Steven J Hamrock, Michael Yandrasits, Bryan S Pivovar](#)

1598 [Aqueous  \$pK\_a\$  and Hydroxide Stability of Imidazolium Derivatives](#)

[Vincent de Paul Nzuwah Nziko, Jiun-Le Shih, Santa Jansone-Popova, Vyacheslav Bryantsev](#)

1599 [Non-Fluorinated High Performance Pre-Irradiation Grafted Anion-Exchange Membranes](#)

[Lianqin Wang, John Varcoe](#)

1600 [Ionic Functionalization of Polystyrene-b-poly\(ethylene-co-butylene\)-b-polystyrene via Friedel-Crafts Bromoalkylation and Its Application for Anion Exchange Membranes](#)

[Jong Yeob Jeon, Angela D Mohanty, Ding Tian, Chulsung Bae](#)

1601 [\(Invited\) Structured Electrochemical Materials Fabricated from Directed Self-Assembly of Block Copolymers and Advanced Lithography](#)

[Le Zhang, Chi Cao, Alexandrina Yakimov, Christopher George Arges](#)

1602 [Alkaline Durable Anion-Conducting Electrolyte Membranes Prepared by Radiation Induced Grafting of 2-Methyl-4-vinylimidazole for Non-Platinum Direct Hydrazine Hydrate Fuel Cells](#)

Yasunari Maekawa, Kimio Yoshimura, Kouta Takeuchi, Akihiro Hiroki, Shun Watanabe, Tokio Hagiwara, Hideyuki Shishitani, Susumu Yamaguchi, Hirohisa Tanaka

1603 Anion Exchange Membrane Ionic Conductivity in the Presence of Carbon Dioxide under Fuel Cell Operating Conditions

Jacob A. Wrubel, Aldo A. Peracchio, Brice N. Cassenti, Timothy D. Myles, Kyle N. Grew, Wilson K. S. Chiu

1604 Anion Exchange Membranes: Correlation between Physicochemical Properties and Anion Conductivity By Broadband Electrical Spectroscopy

Vito Di Noto, Keti Vezzù, Enrico Negro, Federico Bertasi, Graeme Nawn, Andrew M Herring

1605 A Study of Carbonate Formation Kinetics and Morphological Effects Observed on OH<sup>-</sup> Form of Pfaem When Exposed to Air Containing CO<sub>2</sub>

Ashutosh G Divekar, Andrew Michael Park, Zbyslaw R. Owczarczyk, Soenke Seifert, Bryan S Pivovar, Andrew M Herring

1606 (Invited) Kinetic Modeling of the Borohydride Oxidation Reaction (BOR) at Gold and Platinum Electrodes

Pierre-Yves Olu, Guillaume Braesch, Antoine Bonnefont, Elena R. Savinova, Marian Chatenet

1607 Auspicious Metal-Doped-Cu<sub>2</sub>O/Cu Dendrite (M=Ni, Co, Fe) Catalysts for Direct Alkaline Fuel Cells: Effect of Dopants

Gumaa A. El-Nagar, Igor Derr, Tintula Kottakkat, Christina Roth

1608 Hierarchical Titanium Nitride Nanostructures As Catalyst Scaffold for PEMFC Technology

Andrea Perego, Giorgio Giuffredi, Andrea Casalegno, Fabio DiFonzo

1609 Approaching 2 W·cm<sup>-2</sup> AEMFCs through Electrode Engineering and Controlling the Cell Water Content and Balance

[Travis J Omasta, Xiong Peng, William E Mustain](#)

1610 [Quantification of Active Sites at Spinel Type Metal Oxide Catalysts by Surface Interrogation Scanning Electrochemical Microscopy](#)

[Julian Behnken, Xiaohui Deng, Harun Tüysüz, Alexander Dyck, Gunther Wittstock](#)

1611 [Highly Stable and Methanol Tolerant RuTe<sub>2</sub>/C Electrocatalysts in Alkaline Media](#)

[Qing Gong, Jiwu Zheng, Ye Wang, Shuiping Gong, Weifeng Yang, Xuan Cheng](#)

1612 [High CO<sub>2</sub> Selectivity PtRh/rGN Catalysts for Ethanol Electrooxidation](#)

[Fuchun Zhu, Yanxia Jiang, Shigang Sun](#)

1613 [Pt-Ru/C Catalyst Performance during Direct Methanol Fuel Cell Operation](#)

[Drew Joseph Pereira, Cody H Wilkins, Sirivatch Shimpalee, John W. Weidner](#)

1614 [Sodium Borohydride Oxidation on Pt and/or Pd-Based Electrodes in Hydrogen Peroxide Direct Borohydride Fuel Cells \(H<sub>2</sub>O<sub>2</sub>-DBFCs\)](#)

[Rachel Marielle Emily Hjelm, Yannick Garsany, Robert W. Atkinson, Richard O'Neil Stroman, Karen Swider-Lyons, Clémence Lafforgue, Marian Chatenet](#)

1615 [Influence of SnO<sub>2</sub> Orientation on Electrocatalytic Activities of Pt/SnO<sub>2</sub> Model Electrodes for Methanol Oxidation](#)

[Kohei Miyazaki, Takahide Nagase, Tomokazu Fukutsuka, Takeshi Abe](#)

1616 [Methodology for the Design of Accelerated Stress Tests for Non-Precious Metal Catalysts in Alkaline Fuel Cell Cathodes](#)

[Lior Elbaz](#)

1617 [Structure and Performance of Fe-N-C PGM-Free Cathode Catalysts Derived By Polymerization-Pyrolysis and Sacrificial Support Method](#)



[Yechuan Chen, Rohan Rajeev Gokhale, Alexey Serov, Kateryna Artyushkova, Plamen Atanassov](#)

1618[Highly Porous Nitrogen-Doped Carbon-Supported Pt Nanoparticles with Enhanced Activity for the Oxygen Reduction Reaction in Alkaline Media](#)

[Naoki Tachibana, Saori Ikeda, Yasuyuki Yukawa, Masahiro Kawaguchi](#)

1619[N□P-Dual Doped Porous Carbon with Trace Level Co Doping As Highly Efficient Electrocatalyst for Oxygen Reduction Reaction](#)

[Dafeng Yan, Shuangyin Wang](#)

1620[Co,N-Codoped Mesoporous Carbon As Efficient Bifunctional Catalysts for Oxygen Reduction and Hydrogen Evolution Reaction](#)

[Xiaojun Liu, Shouzhong Zou](#)

1621[Investigating Non-Precious Metal Catalyst-Electrolyte Interface in Anodes for Alkaline Fuel Cells](#)

[Claudia Wuillma Narvaez Villarrubia, Alexey Serov, Joseph H Dumont, Plamen Atanassov, Yu Seung Kim](#)

1622[Direct Ethanol Fuel Cell for Portable Power](#)

[Michael Beachy, Paul Matter, Christopher Holt](#)

1623[Synthesis, Characterization, and Alkaline Stabilities of p-\(2-imidazoliumyl\) Styrene-Grafted Anion-Conducting Electrolyte Membranes Prepared By Radiation-Induced Grafting for Fuel Cells](#)

[Hwan-Chul Yu, Kimio Yoshimura, Yue Zhao, Akihiro Hiroki, Hideyuki Shishitani, Susumu Yamaguchi, Hirohisa Tanaka, Yasunari Maekawa](#)

1624[Interface-Controlled Synthesis of Platinum-Free Anode Catalyst for Fuel Cells Application](#)

[Wei Ding, Sicheng Tao, Zidong Wei](#)

1625 [Electrocatalysts for Ethanol and Methanol Oxidation Prepared by Ion Beam Assisted Deposition of Platinum and Rare Earths Metals on Carbon Fiber Paper Catalyst Carriers](#)

[Vasily Poplavsky, Alexandr Dorozhko, Vladimir Matys](#)

1626 [N-Cdot/Pd Nanosponge with Enhanced Electrocatalytic Activity for Hydrogen Evolution Reaction and Methanol Oxidation Reaction](#)

[Ho-Suk Choi, Van-Toan Nguyen](#)

1627 [Improved Anode Catalyst for Formic Acid Fuel Cells](#)

[Kailey D Pemberton, Cynthia A. Rice](#)

1628 [Influence of Methanol Crossover on Cathode Catalyst in Direct Methanol Fuel Cell](#)

[Zuzana Komárková, Roman Fiala, Vladimir Matolin](#)

1629 [Development of Stable Precious Metal-Free Cathodes in Alkaline Fuel Cells](#)

[Ilena Grimmer, Florian Gebetsroither, Birgit Pichler, Maximilian Grandi, Peter Kalal, Barry Iseard, Robert Aronsson, Alexander Schenk, Viktor Hacker](#)

1630 [Synthesis of N-Doped Graphene By Sonochemical Liquid Exfoliation and Its Electrochemical Performance for ORR in Alkaline Media](#)

[Mayra Z Figueroa-Torres, Ivonne Liliana Alonso-Lemus, Beatriz Escobar-Morales, F.J. Rodriguez-Varela, Antonio Fernández-Fuentes](#)

1631 [\(Invited\) Probing the Activity of Transition Metal Oxide Nanoparticles Towards the Oxygen Reduction Reaction](#)

[David Fermin, Veronica Celorrio, Laura Calvillo, Andrea E Russell, Gaetano Granozzi](#)

1632 [Imidazoles-Derived PGM-Free Cathode Catalysts for Oxygen Reduction Reaction](#)

[Rohan Rajeev Gokhale, Yechuan Chen, Alexey Serov, Kateryna Artyushkova, Plamen Atanassov](#)

1633 [Oxygen Electrocatalysis on Transition Metal Spinel Oxides](#)

[ZhiChuan, Jason Xu](#)

1634 [Effect of pH on the Activity of Hydrogen Oxidation Reaction/Hydrogen Evolution Reaction over PtRu Bimetallic Catalysts](#)

[Jared Nash, Jie Zheng, Bingjun Xu, Yushan Yan](#)

1635 [Ni-Based Hydrogen Oxidation Reaction Electrocatalysts for Alkaline Anion-Exchange Membrane Fuel Cells: Systematic Study on the Doping Effect](#)

[Elena S. Davydova, Dario R. Dekel](#)

1636 [FeNi<sub>2</sub>Se<sub>4</sub> – Reduced Graphene Oxide Nanocomposite: Enhancing Electrocatalytic Activity for Water Oxidation through Synergistic Effects](#)

[Siddesh Umapathi, Jahangir Masud, Abdurazag T Swesi, Manashi Nath](#)

1637 [Nickel Metal Alloy's As PGM-Free Catalysts for Hydrogen Oxidation Reaction in Anion Exchange Membrane Fuel Cells](#)

[Aaron Joseph Roy, Plamen Atanassov, Kateryna Artyushkova, Alexey Serov, Barr Zulevi, Morteza Rezaei Talarposhti](#)

1638 [Decoupling the Hydrogen Binding Energy to the Hydrogen Oxidation Reaction Kinetics in Alkaline Media](#)

[Jingkun Li, Shraboni Ghoshal, Michael Bates, Sanjeev Mukerjee, Qingying Jia](#)

1639 [A Model Based Analysis of Alkaline Membrane Fuel Cells](#)

[Igal G Rasin, Miles Page, Dario R. Dekel, Simon Brandon](#)

## **I01F-Polymer Electrolyte Fuel Cells 17 (PEFC 17) - Polymer-Electrolyte Electrolysis**

[1437\(Invited\) Innovative Low Cost Bipolar Plates and Current Collectors for Proton Exchange Membrane Electrolyzers](#)

[Aldo Saul Gago, Philipp Lettenmeier, K. Andreas Friedrich](#)

[1640Electrodeposition of Amorphous Molybdenum Sulfide on Carbon Paper As an Electrocatalyst for Hydrogen Evolution Reaction](#)

[Jung Hwan Kim, Junhyeong Kim, Hyunki Kim, Sang Hyun Ahn](#)

[1641Porous Silver/Indium and Gold/Indium Electrocatalysts for Electrochemical Conversion of Carbon Dioxide](#)

[Hyunju Lee, Hyenki Kim, Sang Hyun Ahn](#)

[1642Morphological and Compositional Effects of Electrochemically Fabricated Cobalt Phosphide on Water Electrolysis](#)

[Junhyeong Kim, Hyunki Kim, Jung Hwan Kim, Sang Hyun Ahn](#)

[1643Electrochemical Conversion of Carbon Dioxide into Formic Acid Using Porous Tin Catalyst](#)

[Hyenki Kim, Hyunju Lee, Sang Hyun Ahn](#)

[1644Fern-like Nickel Cobalt Sulfide Electrocatalyst Prepared By Electrodeposition and Subsequent Sulfur Ion Exchange for Water Electrolysis](#)

[Hyunki Kim, Junhyeong Kim, Jung Hwan Kim, Sang Hyun Ahn](#)

[1645Development of Carbon-Free Electrocatalysts for Water Electrolysis](#)

[Marika Muto, Kazunari Sasaki, Akari Hayashi](#)

[1646Highly Efficient Ni-Fe Based Oxygen Evolution Catalyst Prepared By a Novel Pulse Electrochemical Approach](#)

[Gongwei Wang, Dong Zheng, Dan Liu, Joshua Harris, Jingyu Si, Tianyao Ding, Deyang Qu](#)

1647 [Titanium Oxide Nanosheets for Proton-Exchange Membrane Oxygen Evolution Electrocatalysts](#)

[Randall Archer, Fernando Godinez-Salomon, Christopher Rhodes](#)

1648 [Accelerated Degradation Test in PEM Water Electrolysis](#)

[Alexandra Weiß, Maximilian Bernt, Armin Siebel, Philipp J. Rheinländer, Hubert A. Gasteiger](#)

1649 [\(Invited\) Elucidating Oxygen Evolution on Model Oxide Electrodes](#)

[Ifan Erfyl Lester Stephens](#)

1650 [\(Invited\) Three-Dimensional Analysis of Electrode Structures](#)

[Kateryna Artyushkova, Mosaddek Hossen, Alexey Serov, Plamen Atanassov, Chris Capuano, Nemanja Danilovic, Katherine E Ayers](#)

1651 [A Novel Fabrication Technique for Electrodes of PEM Water Electrolyzers](#)

[Melanie Bühler, Carolin Klose, Friedemann Hegge, Thomas Lickert, Simon Thiele](#)

1652 [Hollow Iridium-Based Catalysts for the Oxygen Evolution Reaction in Proton Exchange Membrane Water Electrolyzers](#)

[Jennifer Peron, Marco Faustini, Marion Giraud, Jacques Rozière, Deborah J. Jones, Cédric Boissière, Cédric Tard](#)

1653 [Oxygen Evolution and Dissolution of Iridium Based Water Splitting Anodes](#)

[Olga Kasian, Simon Geiger, Daniel J. S. Sandbeck, Maximilian Schalenbach, Serhiy Cherevko, Karl Mayrhofer](#)

[1654Two-Dimensional Iridium-Nickel-Oxide Nanoframes for High Activity Oxygen Evolution Electrocatalysts](#)

[Christopher Rhodes, Fernando Godinez-Salomon, Luis Albiter](#)

[1655Iridium Nanowires As Highly Active, Oxygen Evolution Reaction Electrocatalysts](#)

[Shaun M Alia, Sarah M Shulda, Chilan Ngo, Svitlana Pylypenko, Bryan S Pivovar](#)

[1656Activity-Stability Relationships on Cost-Effective Materials for Hydrogen Evolution Reaction](#)

[Pietro Papa Lopes, Pedro F. B. D. Martins, Vojislav Stamenkovic, Mercuri G. Kanatzidis, Nenad M Markovic](#)

[1657Highly Stable Mn-Based Nanocarbon Bifunctional Electrocatalyst for Oxygen Reduction and Evolution Reactions in Reversible Fuel Cells](#)

[Gang Wu](#)

[1658Membrane Electrode Assembly Design with Various Bifunctional Catalysts in Reversible Anion Exchange Membrane Fuel Cells](#)

[Shuai Zhao, Shiva Gupta, Gang Wu, Hui Xu](#)

[1659Organic Molecular Catalyst for Hydrogen Evolution Reaction](#)

[Xi Yin, Ling Lin, Hoon T Chung, Ulises Martinez, Andrew M. Baker, Sandip Maurya, Piotr Zelenay](#)

[1660Highly-Efficient and Durable Carbon Nanotube-Based Anode Electrocatalyst for Water Electrolyzer](#)

[Tsuyohiko Fujigaya, Yilei Shi, Jun Yang, Hua Li, Akiko Inada, Naotoshi Nakashima, Kohei Ito](#)

[1661Electrode Configuration of Anion Exchange Membrane Electrolyzer](#)

[Hiroshi Ito, Naoki Miyazaki, Masayoshi Ishida, Natsuki Kawaguchi, Satoshi Someya, Tetsuo Munakata, Akihiro Nakano](#)

1662 [Performance and Durability Baselines in Alkaline Hydrogen and Oxygen Evolution Reactions](#)

[Shaun M Alia, Bryan S Pivovar](#)

1663 [AEM Electrolysis Progress and Impact on the Cost of Hydrogen](#)

[Katherine E Ayers, Christopher B Capuano, Luke Wiles](#)

1664 [Direct Electrochemical Compression of Hydrogen and Oxygen Via PEM Water Electrolysis](#)

[Katherine E Ayers, Luke Dalton, Michael Parker](#)

1665 [Analysis of Inkjet Printed Polymer Electrolyte Electrolyzer Electrodes](#)

[Manas Mandal, Antoni Valls, Niklas Gangnus, Marc Secanell](#)

1666 [Correlations between the Porous Transport Layer Properties and the Hydrogen Crossover in Polymer Electrolyte Water Electrolyzers](#)

[Ugljesa Babic, Tobias Schuler, Thomas J. Schmidt, Lorenz Gubler](#)

1667 [Stochastic Generation of Sintered Titanium Powder-Based Porous Transport Layers in Polymer Electrolyte Membrane Electrolyzers and Investigation of Structural Properties](#)

[Jason Keonhag Lee, Aimy Bazylak](#)

1668 [On the Effect of the Flow Field Plate's Geometry on the Polymer Electrolyte Membrane Water Electrolysis Cell's Performance](#)

[Saher Al Shakhshir, Søren Knudsen Kær](#)

1669 [Analysing Gas-Liquid Flow in PEM Electrolyser Micro-Channels Using a Micro-Porous Ceramic as Gas Permeable Wall](#)

[Saeed Sadeghi Lafmejani, Anders Christian Olesen, Saher Al Shakhshir, Søren Knudsen Kær](#)

[1670Challenging of Reducing Electrolysis Voltage by Superimposing Boiling on PEMWE–A Thermodynamic Coupling–](#)

[Kohei Ito, Kenji Terabaru, Hua Li, Akiko Inada, Hironori Nakajima](#)

[1671Generation of Pure Hydrogen by the Electrocatalytic Oxidation of Methane-Derived Liquid Fuels in a PEM Electrolysis Cell](#)

[Claude Lamy, Benoît Guenot, Marc Cretin](#)

[1672Electrochemical Synthesis of Ammonia Using Proton and Hydroxide Exchange Membrane Cells](#)

[Jared Nash, Junhua Wang, Jacob Anibal, Yushan Yan, Bingjun Xu](#)

[1673Membrane Electrolysis for Organic Chemical Hydride Synthesis with Water Oxidation](#)

[Shigenori Mitsushima, Kensaku Nagasawa, Akihiro Kato, Yoshinori Nishiki](#)

[1674Electrochemical De-Hydrogenation of Liquid MCH at Room Temperature](#)

[Saifullah Badar, Manabu Kanou, Yuki Nakata, Hyunjeong Nam, Yuji Zenitani](#)

[1675Low-Voltage Gaseous HCl Electrolysis with Iron Redox-Mediated Cathode for Chlorine Regeneration](#)

[Yun Zhao, Shuang Gu, Junhua Wang, Yushan Yan](#)

### **I01Z-Polymer Electrolyte Fuel Cells 17 (PEFC 17) - Invited Talks**

[1676\(Invited Plenary\) U.S. Department of Energy Hydrogen and Fuel Cell Activities: Progress and Opportunities](#)

[Sunita Satyapal, Eric L. Miller, Dimitrios Papageorgeorgopoulos, Ned T Stetson](#)



[1677\(Invited Plenary\) Fuel Cell Stack Development in Toyota](#)

[Kazuki Amemiya](#)

[1678\(Invited Plenary\) From Moon Shot to the Battlefield and Under the Sea](#)

[Charles Freese](#)

[1679\(Invited Plenary\) Ultrathin Film NSTF ORR Electrocatalysts for PEM Fuel Cells](#)

[Andrew J. Steinbach, Cemal Duru, Andrew Thomas Haug, Amy E Hester, Monika Kuznia, Krzysztof A. Lewinski, Sean M. Luopa, Jason T. Petrin, Grant M. Thoma, Arthur Jeremy Kropf, Deborah J Myers, Dali Yang, David A. Cullen, Jeff Greeley, Zhenhua Zeng](#)

[1680\(Invited Plenary\) Latest Research and Development of PEM Water Electrolysis Technology in South Korea](#)

[Sangbong Moon, Changhwan Moon, Hyeyoung Jung, Yunki Choi, Changhyun Han](#)

[1681\(Invited Plenary\) Durability of Polymer Electrolyte Membrane Fuel Cells and the Development of Accelerated Stress Tests](#)

[Rangachary Mukundan, David A. Langlois, Roger Lujan, Natalia Macauley, Sarah Stariha, Andrew M. Baker, Jacob S Spendelow, Karren L. More, Rod L. Borup](#)

[1682\(Invited Plenary\) Electrocatalysis in PEFCs – limitations in the Performance of the Hydrogen Oxidation and Oxygen Reduction Reactions](#)

[Anthony Kucernak](#)

[1683\(Invited Plenary\) Platinum-Free Fuel Cells for Affordable Zero-Emission Cars](#)

[Yushan Yan](#)

## **I02-Ionic and Mixed Conducting Ceramics 11 (IMCC 11)**

[1684\(Invited\) From Discovery through to Commercialization: Federal Support](#)

[Lynnette D Madsen](#)

1685([Invited](#)) [Multi-Species Electrochemical Transport through Multi-Phase Materials](#)

[Anil V. Virkar](#)

1686([Invited](#)) [Mixed Conducting Layered Oxides for Energy Storage: Challenges and Their Mitigation](#)

[Arumugam Manthiram](#)

1687([Invited](#)) [Review of Advances in Solid Oxide Fuel Cells in the Past Four Decades](#)

[Subhash C Singhal](#)

1688[Phase Stability, Electrochemical Activity, and Accelerated Test for SOFC Cathodes](#)

[Emir Dogdibegovic, Yudong Wang, Xiao-Dong Zhou](#)

1689([Invited](#)) [Robust and Active Mixed-Conducting Electrodes for Intermediate-Temperature Fuel Cells](#)

[Yu Chen, Dongchang Chen, Dong Ding, Meilin Liu](#)

1690([Invited](#)) [Enhancing Phase Stability and CO<sub>2</sub> Tolerance of Ba<sub>0.5</sub>Sr<sub>0.5</sub>Co<sub>0.8</sub>Fe<sub>0.2</sub>O<sub>3-δ</sub>](#)

[Ellen Ivers-Tiffée, Laura Almar, Julian Szász, Matthias Meffert, Heike Störmer, Dagmar Gerthsen](#)

1691([Invited](#)) [Modeling Transport Processes in Perovskite-Based Mixed Ionic-Electronic Conducting Membranes](#)

[Robert J. Kee, Huayang Zhu](#)

1692([Invited](#)) [Technological Aspects of Interfaces between Ionic, Mixed Conducting and Other Components in Solid Oxide Fuel Cells](#)

[Nguyen Minh, Yoon Ho Lee](#)

[1693\(Invited\) Role of Ion-Conducting Membranes in Synthesis and Use of Sustainable Fuels](#)

[Grigorii L. Soloveichik](#)

[1694\(Invited\) Electrode Evolution in Solid Oxide Cells](#)

[John Irvine](#)

[1695\(Invited\) High Temperature Ionic Ceramics Fuel Cell to Power Unmanned Aerial Systems \(UASs\)](#)

[Deryn Chu](#)

[1696\(Invited\) Advances in Proton Ceramic Fuel Cells, Steam Electrolyzers, and Dehydrogenation Reactors Based on Materials and Process Optimizations](#)

[Truls Norby](#)

[1697\(Carl Wagner Memorial Award of the Electrochemical Society Address\) Mixed Protonic-Electronic Membrane Reactors; Converting Hydrocarbon Resources and CO<sub>2</sub> to Fuels](#)

[Eric D. Wachsman](#)

[1698\(Invited\) Understanding Anode and Cathode Reaction Mechanisms for Proton Conducting Intermediate Temperature Solid Oxide Fuel Cells](#)

[Shichen Sun, Zhe Cheng](#)

[1699\(Invited\) The ARPA-E Ionics Program: Separators to Enable the Cycling of Lithium Metal](#)

[Paul S. Albertus, Susan J. Babinec, Scott J. Litzelman](#)

[1700\(Invited\) Material, Fabrication and Cell Design for High Loading Li-S Batteries Towards Commercialization](#)

[Fang Dai, Qiangfeng Xiao, Li Yang, Mei Cai](#)

[1701\(Invited\) Sulfide-Based Solid Electrolytes for Solid State Batteries](#)

[Chengdu Liang](#)

[1702\(Invited\) Design of Porous Si/C-Graphite Electrodes with Long Cycle Stability and Controlled Swelling](#)

[Xiaolin Li, Pengfei Yan, Xingcheng Xiao, Jae Ha Woo, Chongmin Wang, Jun Liu, Ji-Guang Zhang](#)

[1703\(Invited\) Tuning the Structure and Property of Electrode Materials of Lithium Battery](#)

[Jun-Tao Li, Ling Huang, Shi-Gang Sun](#)

[1704\(Invited\) Data-Driven Materials Design for Compounds with Improved Mg Intercalation Mobility](#)

[Miao Liu, Ziqin Rong, Nils Zimmermann, Maciej Haranczyk, Gerbrand Ceder, Kristin A Persson](#)

[1705Fabrication of Li- \$\beta\$ " Alumina + Ytria-Stabilized Zirconia Composites and Their Application in Lithium Battery](#)

[Liangzhu Zhu, Anil V. Virkar](#)

[1706Ionic Conductivity of Doped Lanthanum Gallate and Strontium Gallate Composites](#)

[Shirley Leite Reis, Eliana Navarro Santos Muccillo](#)

[1707Optimization of Anion Exchange Membranes Derived from Cross-linked Chitosan-Poly \(diallyldimethylammonium chloride\) for All-solid Electrochemical Capacitors](#)

[Yanan Wei, Bei Ao, Jinli Qiao, Keryn Lian](#)

1708 [Formate Fuel Production From the Electroreduction of CO<sub>2</sub> on Nanostructured SnO<sub>x</sub> Coated on Gas Diffusion Electrode](#)

[Qi Zhang, Yanan Li, Xiao fan Hou, Joey Jung, Jinli Qiao](#)

1709 [Modeling Electrolysis Reaction Mechanism of Fuel Electrodes in Reversible Solid Oxide Fuel Cell / Electrolysis Cell \(RSOFC/EC\) for Hydrogen Energy Storage System](#)

[Hyojae Lee, Yuta Iida, Ryota Shimamura, Kei Hasegawa, Manabu Ihara](#)

1710 [Proton Conducting Properties of Sr<sub>1+x</sub>Ln<sub>1-x</sub>AlO<sub>4-δ</sub> \(Ln=Pr,Sm\) with Layered Perovskite Structure for Solid Oxide Fuel Cells](#)

[Tatsuya Matsuhira, Yusuke Kurahashi, Kei Hasegawa, Manabu Ihara](#)

1711 [Bi-Functional Electrodes for Zinc-Air Batteries](#)

[Nengneng Xu, Jinli Qiao, Yudong Wang, Xiao-Dong Zhou](#)

1712 [\(Invited\) Metal-Supported Solid Oxide Fuel Cells with High Power Density](#)

[Michael C Tucker](#)

1713 [\(Invited\) Review of Progress in Solid Oxide Fuel Cell at FuelCell Energy](#)

[Hossein Ghezel-Ayagh, Brian P Borglum](#)

1714 [Structural and Electrochemical Study on Thin Film Cathodes Fabricated By Spray Pyrolysis](#)

[Lei Zhang, Liangzhu Zhu, Anil V. Virkar](#)

1715 [\(Invited\) Solid Oxide Fuel Cell Development at Redox Power Systems, LLC](#)

[Sean R. Bishop, Lei Wang, Thomas Langdo, Bryan M. Blackburn](#)

[1716Mitigation of Chromium Poisoning Effects in SOFCs By Cathode Compositional Modifications and Interconnect Coatings](#)

[Yiwen Gong, Yuexing Zhu, Zhihao Sun, Soumendra Nath Basu, Uday Bhanu Pal, Srikanth Gopalan](#)

[1717Long Term Testing of Solid Oxide Electrolysis Cells under Co-Electrolysis Conditions](#)

[Megha Rao, Xiufu Sun, Anke Hagen](#)

[1718Development of a Portable SOFC System with Internal Partial Oxidation Reforming of Butane and Steam Reforming of Ethanol](#)

[Hirofumi Sumi, Toshiaki Yamaguchi, Hiroyuki Shimada, Yoshinobu Fujishiro, Masanobu Awano](#)

[1719Performance of Pulse Jet Solid Oxide Fuel Cells Using Liquid Fuel at Steep Output Power Variation](#)

[Yuta Iida, Kei Hasegawa, Manabu Ihara](#)

[1720\(High Temperature Materials Division J. Bruce Wagner, Jr. Award Address\) Disorder and Transport in Pyrochlore Oxides](#)

[Cortney R. Kreller, James Anthony Valdez, Terry Holesinger, Yongqiang Wang, Blas Uberuaga, Ming Tang](#)

[1721\(Invited\) Mapping Internal Polarization in YSZ Electrolytes Using Grain Size](#)

[I-Wei Chen, Yanhao Dong](#)

[1722Predicting Oxygen Vacancy Polaron Size from D-Orbital Splitting in  \$ABO\_3\$  \(A=La, Sr; B=Mn, Fe, Co\) Perovskites](#)

[Tridip Das, Jason D. Nicholas, Yue Qi](#)

[1723Role of Electronic Conduction in Stability of Solid Oxide Electrolyzer Cells \(SOEC\)](#)

[Liangzhu Zhu, Lei Zhang, Anil V. Virkar](#)

1724 [Dynamic and Impure Perovskite Structured Metal Oxide Surfaces](#)

[Karin Vels Hansen, Kion Norrman, Marie Lund Traulsen, Mogens Bjerg Mogensen](#)

1725 [Strain-Based Scanning Probe Techniques for Imaging Space Charge Regions in Sm-Doped Ceria](#)

[Brian S Gerwe, Stuart B. Adler, Ehsan N Esfahani, Peiqi Wang, Qian Nataly Chen, Jiangyu Li](#)

1726 [Electrochemical Study of  \$\(\text{La}\_{0.6}\text{Sr}\_{0.4}\)\_{0.99}\text{CoO}\_{3-\delta}\$  Thin Film Microelectrodes](#)

[Kosova Kreka, Karin Vels Hansen, Torben Jacobsen, Kion Norrman, Christodoulos Chatzichristodoulou, Mogens Bjerg Mogensen](#)

1727 [Electric Field-Assisted Pressureless Sintering of Ceramic Protonic Conductors](#)

[R. Muccillo, Vincenzo Esposito, Daniel Zanetti de Florio, E. N.S. Muccillo](#)

1728 [Effect of Spin Ordering on Oxygen Reduction Reaction on Af/Pm-NiO Surface](#)

[Shu Yamaguchi](#)

1729 [An Analysis of Quantum Effect on the Proton Conduction in  \$\text{BaZrO}\_3\$  Membrane](#)

[Hiroki Nagashima, Takashi Tokumasu](#)

1730 [Defect Chemistry Analysis of the Nonstoichiometry and Conductivity in  \$\text{Pr}\_{1-x}\text{Nd}\_x\text{O}\_{2-\text{D}}\$](#)

[Yudong Wang, Emir Dogdibegovic, B Koser, Xiao-Dong Zhou](#)

1731 [Improved Electrocatalytic Activity and Durability of  \$\text{NiMn}\_2\text{O}\_4\$ -CNTs as Reversible Oxygen Reaction Electrocatalysts in Zinc-air Batteries](#)

[Xuemei Li, Haoran Li, Qi Nie, Lei Zhang, Jinli Qiao](#)

[1732Bis\(2-chloroethyl\) ether-1,3-bis\[3-\(Dimethylamino\)propyl\]urea copolymer - Chitosan-Poly\(acrylamide-co-diallyldimethylammonium chloride\) blends as membranes For Alkaline Anion-exchange Membranes](#)

[Bei Ao, Ya Nan Wei, Jin Li Qiao](#)

[1733Stabilization of Superionic  \$\delta\$ -Bi<sub>2</sub>O<sub>3</sub> Phase at Room Temperature By Thermal Nanocrystallization of Bismuth Oxide Glasses](#)

[Tomasz Karol Pietrzak, Marek Wasiucioneck, Jerzy Edward Garbarczyk](#)

[1734Physico- Chemical Effects of Block Copolymer of Polyethylene and Polypropylene Glycol \(Pluronic F-127\) on Samarium Doped Ceria \(Ce<sub>0.8</sub>Sm<sub>0.2</sub>O<sub>2</sub>\) Perovskite As Electrolyte for Low Temperature SOFC Application](#)

[Chima Njoku, Bernard Owaga, Patrick Ndungu](#)

[1735Innovative Approach on Nano-Metal Particles of Electrodes for Solid Oxide Cells](#)

[Jae-ha Myung, Dragos Neagu, John T. S. Irvine](#)

[1736Development of Solid Oxide Fuel Cells Using Metal-Free Anode with Direct Synthesis of Carbon Nanotubes](#)

[Mankichi Hosoda, Yuta Iida, Ryota Shimamura, Kei Hasegawa, Manabu Ihara](#)

[1737Simultaneous Function of Gd<sub>2</sub>O<sub>3</sub> As Solid Dopant and Sintering Aid for Anode Support Type Solid Oxide Fuel Cells](#)

[Chanho Kim, Inyoung Jang, Sungmin Kim, Heesung Yoon, Ungyu Paik](#)

[1738Mechanical Characterization of SOFC Anode Support Materials at Operating Conditions](#)

[Patrick Stanley, Thomas H Hays, Eric D. Wachsman](#)



[1739](#)[Microstructural Characterization of Solid Oxide Fuel Cell Anodes Operating on Hydrocarbon Fuels](#)

[Ian Robinson, Mohammed Hussain Abdul Jabbar, Yi-Lin Huang, Eric D. Wachsman](#)

[1740](#)[Optimizing the Thickness of Esb-GDC Bilayer Electrolytes for Efficient Low Temperature Operating SOFCs](#)

[Yaoyu Ren, Mohammed Hussain Abdul Jabbar, Yi-Lin Huang, Ian Robinson, Patrick Stanley, Alireza Pesaran, Eric D. Wachsman](#)

[1741](#)[Development of Stabilized Bismuth Oxide Based Composite Cathodes for Low Temperature SOFCs](#)

[Alireza Pesaran, Abhishek Jaiswal, Eric D. Wachsman](#)

[1742](#)[Chemical and Electrochemical Properties of  \$\text{La}\_{0.58}\text{Sr}\_{0.4}\text{Fe}\_{0.8}\text{Co}\_{0.2}\text{O}\_{3-\delta}\$  \(LSCF\) Thin Films upon Oxygen Reduction and Evolution Reactions](#)

[Simon Pitscheider, Michael Machala, Zixuan Guan, Di Chen, Johan Hjelm, Torben Jacobsen, William C Chueh, Mogens Bjerg Mogensen, Christodoulos Chatzichristodoulou](#)

[1743](#)[Nanostructured Electrodes for Low-Temperature Operating SOFCs](#)

[Mohammed Hussain Abdul Jabbar, Yi-Lin Huang, Christopher Pellegrinelli, Ian Robinson, Ke-Ji Pan, Eric D. Wachsman](#)

[1744](#)[Correlation of Structure and Surface Exchange Kinetics on Bismuth-Based Oxides](#)

[Yi-Lin Huang, Christopher Pellegrinelli, Mohammed Hussain Abdul Jabbar, Ian Robinson, Eric D. Wachsman](#)

[1745](#)[A Novel  \$\text{Pr}\_2\text{NiO}\_4/\text{Pr}\_6\text{O}\_{11}\$  Based Composite As the Cathode for Solid Oxide Fuel Cells](#)

[Yudong Wang, Emir Dogdibegovic, Xiao-Dong Zhou](#)

[1746Development of High Performance Intermediate Temperature Proton-Conducting Solid Oxide Electrolysis Cells](#)

[Wei Wu, Dong Ding, Ting He](#)

[1747Solid Acid Proton Conductors: Insights into Proton Conduction Mechanisms and Advances in Electrode Architectures](#)

[Ramez Ahmed Elgammal, Thomas A. Zawodzinski](#)

[1748Accelerated Computational Design of Mixed Protonic and Electronic Conduction for H<sub>2</sub> Separation through Tailoring Polaron](#)

[Qiang Bai, Yizhou Zhu, Xingfeng He, Yifei Mo](#)

[1749Intermediate Temperature Synthesis and SOFC Anode Application of Cerium Silicate-Based Oxy-Apatites](#)

[Sunghwan Lee, Shriram Ramanathan](#)

[1750Hydrogen and Ethylene Production through Water-Splitting and Ethane Dehydrogenation Using BaFe<sub>0.9</sub>Zr<sub>0.1</sub>O<sub>3-δ</sub> Mixed-Conductors](#)

[Georgios Dimitrakopoulos, Robert C. Schucker, Kasia Derrickson, Justin R. Johnson, Karina K. Kopeć, Lei Shao, Faisal Alahmadi, Ahmed F. Ghoniem](#)

[1751High-Temperature Neutron Diffraction Study on PbWO<sub>4</sub> and CaWO<sub>4</sub>-Based Oxide Ion Conductors with Different Defect Structure](#)

[Shigeomi Takai, Souki Kaji, Takeshi Yabutsuka, Takeshi Yao](#)

[1752Fabrication and Testing of Anode Supported Protonic Ceramic Fuel Cells in Biogas](#)

[Narendar Nasani, D Pukazh Selvan, Duncan Paul Fagg](#)

[1753Features of Molten Oxide Fuel Cells and Molten Oxide Membranes for Electrochemical Energy Conversion and Oxygen Separation](#)

[Valery Belousov](#)

## **J01-Luminescence and Display Materials: Fundamentals and Applications**

[1754\(Invited\) Investigation of Thermal Quenching Process for 5d-4f and 3d-3d Luminescence](#)

[Jumpei Ueda, Setsuhisa Tanabe](#)

[1755Fluoride Phosphors with Mn<sup>4+</sup> Ions: Relations between Structure and Emission Spectra](#)

[Mikhail G. Brik, Alok M Srivastava](#)

[1756Photoluminescence Properties of Red-Emitting Ca<sub>3</sub>ZrSi<sub>2</sub>O<sub>9</sub>:Eu<sup>2+</sup> Phosphors](#)

[Yasushi Sato, Riho Miyake, Koji Tomita, Masato Kakihana](#)

[1757Investigation on Structure-Energy Relationship for Ce<sup>3+</sup> Coordinated with Six or Eight Oxygen Ions Based on First-Principles Calculations](#)

[Kazuyoshi Ogasawara](#)

[1758\(Invited\) Narrow Band Emission of Nitrides Phosphors and All Inorganic Perovskite Quantum Dots for the Application in Light Emitting Diodes](#)

[Ru-Shi Liu](#)

[1759\(Invited\) Spectrally Narrow Quantum Dots and Red Phosphor in White LEDs for Display Applications](#)

[Sumit Gangwal, Danielle Chamberlin, Ken Shimizu, Hans-Helmut Bechtel, Thomas Diederich, Stefan Grabowski, Daniel Estrada, Marcel Bohmer, Jyoti Bhardwaj](#)

[1760\(Invited\) Cr<sup>3+</sup> and Mn<sup>4+</sup>: Dopants for Near-Infrared Emitting Persistent Phosphors](#)

[Dirk Poelman, Olivier Q De Clercq, Jia Ren Du, Gwenny Veronique Verfaillie, Katleen Korthout](#)

1761 Enhanced Understanding of Persistent Luminescence in Submicron Particles of SrAl<sub>2</sub>O<sub>4</sub>:Eu<sup>2+</sup>, Dy<sup>3+</sup>

Erin Finley, Angelica Cobb, Adheesha Danthanarayana, Heather Goux, Richard Willson, Jakoah Brgoch

1762 (Invited) Photoluminescence, Optically Stimulated Luminescence and Radiophotoluminescence of Storage Phosphors – a Lecture Learnt from Lu<sub>2</sub>O<sub>3</sub>:Tb, Lu<sub>2</sub>O<sub>3</sub>:Pr and LuPO<sub>4</sub>:Eu

Eugeniusz Zych, Dagmara Kulesza, Paulina Bolek, Justyna Zeler, Adrie J.J. Bos, Jumpei Ueda

1763 (Invited) All-Inorganic YAG Phosphor-in-Glass Light Convertor for Next-Generation Modular High-Brightness White LEDs/Lds

Jing Wang, Xuejie Zhang, Jinbo Yu, Yujin Cho, Rong-Jun Xie

1764 Transparent Ce,Sm:TAG Luminescent Ceramics for High Power Blue Laser Driven Lightning and Display Technologies

Mustafa H Balci, Fan Chen, Ahmet Burak Cunbul, Oyvind Svensen, Muhammad Nadeem Akram, Xuyuan Chen

1765 (Invited) Laser Sintering of Polycrystalline Ceramic Scintillators: The Case Study of YAG:Ce

Jerre C.A. dos Santos, Artem A. Trofimov, David V. Sampaio, Ronaldo S. da Silva, Luiz G. Jacobsohn

1766 Investigation of Blue Excitation Dependent Conversion Efficiency in Phosphors for High Luminance Applications: Part 2

Madis Raukas, James Avallon, John Kelso, Alan Lenef

1767 (Invited) Additively Manufactured Gain Media for Lasers

Stephen Payne, Nerine Cherepy, Ivy K Jones, Zachary Seeley, Eric Duoss

[1768\(Invited\) Studies of Luminescence Efficiency of BaWO<sub>4</sub>:Ce Crystals](#)

[Damian Wlodarczyk, Marek Berkowski, Michal Glowacki, Slawomir Kaczmarek, Zbigniew Kowalski, Mikhail Brik, Aleksander Wittlin, Hanka Przybylinska, Yaroslav Zhydachevskii, Andrzej Suchocki](#)

[1769Systematic First-Principles Calculations of Charge Transfer Transitions of Rare Earth Ions in Oxides Using Simple Cubic Model Cluster](#)

[Shota Takemura, Kazuyoshi Ogasawara](#)

[1770Electronic Structures and Optical Properties of Al, Cu and Ag in Bulk, Thin Film and Nanoparticle Forms](#)

[Kailash C. Mishra, Alan Piquette, Peter C. Schmidt, Keith H Johnson](#)

[1771\(Invited\) Up-Conversion Luminescence of Lanthanide Activated Phosphors](#)

[Hendrik C Swart, RE Kroon, JJ Terblans, A Pandey, A Kumar, J Holsa](#)

[1772\(Invited\) Upconversion: Photoswitching, Photocleavable](#)

[J. A. Capobianco](#)

[1773Fabrication of Green Light-Emitting Diode Using N-in<sub>2</sub>O<sub>3</sub> nanorods Formed on Surface Modified P-GaN Template](#)

[Dong Su Shin, Taek Gon Kim, Dongwook Heo, Hahnjoo Yoon, Jinsub Park](#)

[1774Rare Earth Doped Nanocrystalline Anatase Powders: Structural, Morphological and Optical Properties](#)

[Vesna Đorđević, Bojana Milićević, Miroslav Dramićanin](#)

[1775Changes in the Optical and Electronic Properties of CdTe Quantum Dots By the Effect of Interaction with Free Radicals in Aqueous Solution](#)

[Emilio Alonso Navarrete, Julia Pérez-Prieto, Víctor Rojas, Javier Román, Rodrigo Gonzalo Henríquez, Ricardo Silvio Schrebler, Eduardo Carlo Muñoz](#)

[1776Tb<sup>3+</sup>-Eu<sup>3+</sup> Energy Transfer in Tb-Based Phosphates: A Comparison of Two Extreme Cases](#)

[Irene Carrasco, Fabio Piccinelli, Marco Bettinelli](#)

[1777The Effect of Electron and Hole Transfer Layers on the Electro-Optical Properties of Solution-Processed QD-LED](#)

[Woon-Seop Choi](#)

[1778Facile Synthesis of Graphene Oxide and Graphene Oxide Quantum Dots for Trace Eu<sup>3+</sup> and Tb<sup>3+</sup> Detection](#)

[Botong Liu, Ling Huang, Wei Huang](#)

[1779White-Light Emitting Carbon Dot Species from Carbonization in Zeolite Template](#)

[Seung Hyeon Ko, Hongjun Park, Taekyoung Lee, Ryong Ryoo](#)

[1780Synthesis, Structure and Luminescence of Dy Doped Na<sub>0.25</sub>K<sub>0.25</sub>Bi<sub>0.5</sub>TiO<sub>3</sub>](#)

[Mina Medic, Ljubica Đaćanin Far, Jelena Papan, Vesna Đorđević, Miroslav Dramicanin](#)

[1781\(Invited\) Overview of Different Schemes for Temperature Sensing from Luminescence of Lanthanide Doped Materials](#)

[Miroslav Dramicanin](#)

[1782Lanthanide-Doped Luminescent Materials for Use As Temperature Sensors Under Extreme Conditions](#)

[Hergen Eilers, Benjamin Richard Anderson, Ray Gunawidjaja](#)

[1783\(Invited\) Shedding Light in Nanothermometry](#)

[Luís D Carlos](#)

1784[Potential of Using EuD<sub>4</sub>tea for Space-Based Damage and Radiation Sensors](#)

[William A Hollerman, Ross S Fontenot, Paul Darby, Nick Pugh](#)

1785[Temperature Sensing Using Upconversion in Rare Earth Doped Thermographic Phosphors](#)

[Suresh Kumar Jakka, Pavani Krishnapuram, Manuel Jorge Soares, Manuel Pedro Fernandes Graça](#)

1786[Impact of Processing on Photoluminescence Properties of 4H-SiC for Potential Qubit Applications](#)

[Shojan Pullockaran Pavunny, Hunter Banks, Paul Klein, Kevin Daniels, Matthew T DeJarld, Evan Glaser, Sam G Carter, Rachael L. Myers-Ward, Kurt Gaskill](#)

## **L01-Physical and Analytical Electrochemistry General Session**

1787[Electrochemical Cycling Process for Ammonia Synthesis Using N<sub>2</sub> and H<sub>2</sub>O at Atmospheric Pressure](#)

[Joshua M McEnaney, Aayush R. Singh, Jay Schwalbe, Jakob Kibsgaard, John Lin, Matteo Cargnello, Thomas F Jaramillo, Jens Nørskov](#)

1788[Hydrogen Permeation in Nuclear Components at High Temperatures: Preliminary Electrochemistry Study](#)

[Ruth A Carvajal-Ortiz, Stuart B Lyon, Michael Preuss, Antoine Ambard](#)

1789[Poison-Resistant Electrocatalysis Enabled By Encapsulation of Platinum with Silicon Oxide Nanomembranes](#)

[Natalie Yumiko Labrador, Eva Liza Songcuan, Chathuranga De Silva, Daniel V Esposito](#)

1790[Simulating a Potential Step Using Shareware](#)

[Inam ul Haque](#)

[1791Determination of Manganese in Whole Blood By Stripping Analysis with Indium Tin Oxide](#)

[Cory Allen Rusinek, Wenjing Kang, Michael Becker, Bettina Wehring, Ian Papautsky, Adam Bange, William R. Heineman, Thomas Schuelke](#)

[1792The Effect of Proton Transfer on Redox-Responsive Dimerization in Electroactive 4 H-Bond Arrays](#)

[Diane K. Smith, Ghazwan M Darzi](#)

[1793The Role of Structure Making/Breaking Ions in Solvation Shell and Redox Reaction Entropy of Outer Sphere Electron Transfer Reactions](#)

[Botao Huang, Sokeseiha Muy, Shuting Feng, Yang Shao-Horn](#)

[1794Thermodynamic Properties of Strontium-Lead Alloys Determined By Electromotive Force Measurements](#)

[Thomas Patrick Nigl, Timothy Lichtenstein, Nathan Douglas Smith, Hojong Kim](#)

[1795Electrochemical Characterization of Chitosan Films As Proton-Conducting Layers for Bioprotonic Devices](#)

[Jeremy Pietron, Jeremy T. Robinson, Brandon Blue, Erik Josberger, Yingxin Deng, Marco Rolandi](#)

[1796Biosensor Experiments in Undergraduate Laboratories](#)

[Alice H Suroviec](#)

[1797Low-Platinum Electrocatalysts for the Oxygen Reduction Reaction at Fuel Cell Cathodes](#)

[Maha Yusuf](#)



[1798Ar Plasma Exfoliated Nickel Iron Layered Double Hydroxide Nanosheets into Ultrathin Nanosheets As Highly-Efficient Electrocatalysts for Water Oxidation](#)

[Yanyong Wang, Shuangyin Wang](#)

[1799Nitrogen-Doped Ordered Mesoporous Carbon/Graphene Framework As Dual Electrocatalyst for Oxygen Reduction and Evolution Reactions](#)

[Changlin Zhang, Biwei Wang, Angang Dong, Zhenmeng Peng](#)

[1800Heat-Treated Transition Metal Hexacyanometallates with Trace Amount of Pt As Electrocatalysts for the Oxygen Reduction Reaction Based on Nitrogen Doped Graphene: Catalysts Development and Electrode Structure Design](#)

[Krzysztof Miecznikowski, Beata Dembinska, Sylwia Zoladek, Iwona Agnieszka Rutkowska, Enrico Negro, Pawel J Kulesza, Vito Di Noto](#)

[1801Molybdenum Borides for Hydrogen Evolution Reaction: Theoretical Study and Experimental Proof](#)

[Boniface P.T. Fokwa](#)

[1802Binary Molybdenum Borides Nanostructures As Novel Electrocatalysts for Hydrogen Evolution Reaction](#)

[Palani Raja Jothi, Boniface P.T. Fokwa](#)

[1803Nonlinear Electrochemical Impedance Spectroscopic Analysis of Ti Dissolution in HF](#)

[Ramanathan Srinivasan, Rajesh Pachimatla](#)

[1804Analysis of Cerium Oxide Doped Anti-Corrosion Coatings By Scanning Electrochemical Microscopy and Electrochemical Impedance Spectroscopy](#)

[Jules Murphy, Fred Lancaster, R. L. Calhoun](#)

[1805Elucidating Electro-Hydrodynamics at a Liquid Metal Oxide-Electrolyte Interface Via Electrochemical Impedance Spectroscopy](#)

[Ishan D Joshipura, Michael D. Dickey](#)

1806 [Impedance of Nickel and Platinum Anodic Dissolution in Anhydrous Hydrogen Fluoride](#)

[Piotr Polczynski, Zoran Mazej, Wojciech Grochala, Rafal Robert Jurczakowski](#)

1807 [Effect of Surface Binding on Individual Bacterial Cells: Raman and AFM Approaches](#)

[Nikolai Lebedev, Leonard M Tender](#)

1808 [Novel Spectral Analysis for Evaluation of the Strength of Coordination Bonds in Li<sup>+</sup> Polymer Electrolyte Composites By ATR-Far-UV](#)

[Nami Ueno, Yusuke Morisawa, Tomonori Wakabayashi](#)

1809 [Influence of Morphology Controlled Gold Underlayer on Photoelectrochemical Water Splitting of Copper \(I\) Oxide As a Photocathode](#)

[Tian Lan, Colton Mundt, Sonal Padalkar](#)

1810 [New Insights into Organic Dye Regeneration Mechanism in Dye-Sensitized Solar Cells: A Theoretical Study](#)

[Yohannes Mulugeta Hailu, Wan-Ru Shie, Santhanamoorthi Nachimuthu, Jyh-Chiang Jiang](#)

1811 [Comparative Electrochemical, Photoelectrochemical and Photocatalytic Abatement of Emerging Pollutant](#)

[Sajjad Hussain](#)

1812 [Spectroelectrochemical Studies of IL/Electrode Interfaces](#)

[Scott K Shaw, Radhika S Anareddy, Anthony J Lucio, Jaclyn Wrona](#)

[1813In Situ and Operando Observation of Oxide Layer on Electrodes during the Oxygen Evolution Reaction](#)

[Cigdem Toparli, Martin Rabe, Andreas Erbe](#)

[1814In Situ Surface Enhanced Infrared Absorption Spectroscopy for Nitric Oxide Reduction Catalyzed By Bacterial Nitric Oxide Reductase](#)

[Ichizo Yagi, Shogo Nakagawa, Takehiko Tosha, Kou Nakata, Masaru Kato](#)

[1815In-Situ THz SERS Observation of Electrochemical Processes](#)

[Motoharu Inagaki, Katsuyoshi Ikeda](#)

[1816Cobalt Catalysts for Oxygen Evolution Studied By Operando Soft X-Ray Absorption Spectroscopy](#)

[Masaaki Yoshida, Yosuke Mitsutomi, Masanari Nagasaka, Hayato Yuzawa, Nobuhiro Kosugi, Hiroshi Kondoh](#)

[1817In-Situ Estimation of Near Electrode pH during the Electrochemical Reduction of CO<sub>2</sub> Using Attenuated Total Reflectance Surface Enhanced Infrared Absorption Spectroscopy](#)

[Marco Dunwell, Yushan Yan, Bingjun Xu](#)

[1818Investigation on Sulfide-Enhanced Oxygen Reduction Reaction Activity By in-Situ Electrochemical Infrared Spectroscopy](#)

[Dejun Chen, Yanyan Wang, Thomas C Allison, YuYe Tong](#)

[1819Probing Self-Organization of Molecular Ions at the Interface between Graphene and Ionic Liquids](#)

[Judy Wu](#)

[1820Current-Voltage Relationship Considering the Direction of the Electrical Field in Mixed Ionic-Electronic Solid Conductors](#)

[Tomofumi Miyashita](#)

[1821A Simple Flow Cell for the Measurement of Groundwater Arsenic\(3+/5+\) in the Field](#)

[Douglas Mays, Abul Hussam](#)

[1822Electroless Platinum Deposition for in Situ Spectroelectrochemistry](#)

[Eric A. Gobrogge, Xiaoming Ren, Cynthia A. Lundgren](#)

[1823Special Active Pt\(100\) Site for Room Temperature Electrochemical Activation of Methane](#)

[Hai-bin Ma, Tian Sheng, Zhi-You Zhou, Shi-Gang Sun](#)

[1824Effect of Anion Choice on Conducting Polymer Crystallinity](#)

[Judith F Rubinson](#)

[1825Effect of Silver Particles Electrodeposited on Reticulated Vitreous Carbon for Nitrate Reduction](#)

[Silvia Sizuka Oishi, Andrea Boldarini Couto, Edson Cocchieri Botelho, Neidenei Gomes Ferreira](#)

[1826Electrocatalytic Performance of Three Dimensional Electrode Cu/Reduced Oxide Graphene/ Carbon Fiber for Nitrate Reduction](#)

[Andrea Boldarini Couto, Silvia Sizuka Oishi, Andre Ferreira Sardinha, Neidenei Gomes Ferreira](#)

[1827Porous TiO<sub>2</sub> /BDD/CF Ternary Composite Applied on Brilliant Green Dye Electrochemical Oxidation](#)

[Lania Auxiliadora Pereira, Andrea Boldarini Couto, Neidenei Gomes Ferreira](#)

[1828Electrochemical Oxidation of Methane on Metal Catalysts](#)

[Hamed Ataee-Esfahani, Dejun Chen, YuYe Tong](#)

1829 [Composition Dependence of Physical Constants of Binary Solvent Mixtures](#)

[Noritoshi Nambu](#)

1830 [Electrochemical Interaction Mechanisms of Metal Reducing Bacteria with Functionalized Gold Surfaces during Initial Attachment and in Artificial Biofilms](#)

[Eleni Kastania, Ozlem Ozcan](#)

1831 [Polymer-Coated Boron Doped Diamond Optically Transparent Electrodes for Spectroelectrochemistry](#)

[Robert Rechenberg, Cory Allen Rusinek, Michael Becker, William R. Heineman](#)

## **L02-Photocatalysts, Photoelectrochemical Cells and Solar Fuels 8**

1832 [Highly Efficient Photoelectrochemical and Photocatalytic Anodic TiO<sub>2</sub> Nanotube Layers with Additional TiO<sub>2</sub> coating](#)

[Hanna Sopha, Milos Krbal, Siwoon Ng, Jan Prikryl, Raul Zazpe, Jan M. Macak](#)

1833 [Analysis of Water-Assisted Crystallization Process in Anodically Grown Titania Nanotube Arrays](#)

[Ivy Berlinda Ahiabu, Maggie Paulose, Oomman K Varghese](#)

1834 [Observation of First-Order, Marcus Normal, Interfacial Electron Transfer at Dye-Sensitized TiO<sub>2</sub> Interfaces](#)

[Brian N DiMarco, Ludovic Troian-Gautier, Renato N Sampaio, Gerald J Meyer](#)

1835 [\(Invited\) Enhanced Photoelectrocatalytic Activity for Splitting Water Based on Heterostructured TiO<sub>2</sub> Nanotube Arrays](#)

[Zhi Wu, Lan Sun, Meidan Ye, Zhiqun Lin, Changjian Lin](#)

1836(Invited) TiO<sub>2</sub> Nanotubes in Photocatalysis

Patrik Schmuki

1837Electrochemical Impedance Spectroscopy (EIS) Analysis of TiO<sub>2</sub> Nanoparticles for Hydrogen Production in Photoelectrochemical Cells

Farshid Salimijazi, Pezhman Shirvanian

1838Molecular-Orbital-Based Verification of Effective Water Photo Splitting to HOOH As a Precursor of Oxygen and Hydrogen on Pt-Loaded TiO<sub>2</sub>

Shozo Yanagida, Susumu Yanagisawa, Koichi Yamashita, Ryota Jono, Hiroshi Segawa

1839Hydrogen and Nitrogen Modification of Anodized TiO<sub>2</sub> Nanotube Arrays for Photoelectrochemical Oxidation of Water

Yin Xu, Giovanni Zangari

1840Solar Photoelectrochemical Water Purification

Ryan Cruse, Michael John Sullivan, Eugene S. Smotkin

1841Ag@TiO<sub>2</sub>-TiO<sub>2</sub> NF As a Visible Light Photoanode in Photocatalytic Fuel Cells

Gregory Lui, Gaopeng Jiang, Michael Fowler, Aiping Yu, Zhongwei Chen

1842(Invited) Reflections on Rust: Iron Oxide Photoelectrodes for Solar Energy Conversion and Storage

Avner Rothschild

1843(Invited) Hydrogen and Methylcyclohexane Production By Solar Water Splitting Using Photoelectrochemical Cells

Tsutomu Minegishi, Kazunari Domen

1844(Invited) New Photoanode Materials for Photoelectrochemical Water Splitting

[Yanfa Yan](#)

1845([Keynote](#)) [Design and Synthesis of Electrocatalysts](#)

[Zhi-You Zhou, Na Tian, Yan-Xia Jiang, Shi-Gang Sun](#)

1846([Keynote](#)) [Photocatalytic and Photoelectrochemical Water Splitting and CO<sub>2</sub> Reduction As Artificial Photosynthesis](#)

[Akihiko Kudo](#)

1847([Invited](#)) [NSF's Energy for Sustainability Program: Research Supporting Solar Fuels](#)

[Carole J Read, Robert McCabe](#)

1848([Invited](#)) [Photoelectrochemical Hydrogen Evolution Using Heterostructure of Si with Binary Cobalt Sulfide or Ternary Cobalt Phosphosulfide](#)

[Ru-Shi Liu, Shu-Fen Hu](#)

1849([Invited](#)) [Probing Local, Hybrid Perovskite Photophysics through Spatially- and Temporally-Resolved Absorption/Emission Microscopy](#)

[Masaru Kuno, Sergiu Draguta](#)

1850([Invited](#)) [Semiconductor Photocathode Materials for Direct Solar Fuel Production](#)

[Kevin Sivula](#)

1851([Invited](#)) [Energy Transfer and Catalysis in Metal Organic Framework Arrays](#)

[Amanda J Morris](#)

1852([Invited](#)) [The Bright Future for Electrode Materials—Highly Conductive Porous Na-Embedded Carbon Nanowalls for Energy Conversion and Storage](#)

[Yun Hang Hu](#)

1853 [Novel Nanomaterials and Systems for Solar Fuel and Chemical Production](#)

[Syed Mubeen](#)

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[Jeremy Pietron, Paul A. DeSario, Todd Brintlinger, Olga A Baturina, Rhonda Stroud, Debra R. Rolison](#)

1855 [\(Invited\) Development of Plasmonic Nanostructures for Plasmon-Enhanced Photocatalysis](#)

[Dongling Ma](#)

1856 [\(Invited\) Hot-Electron Driven Photocatalysis and Photoexcited Charge Carrier Dynamics in TiO<sub>2</sub>-Passivated Photocatalysts](#)

[Stephen B. Cronin](#)

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[Tetsu Tatsuma, Kun-Che Kao, Ling Wu, Yoshinori Kuroiwa, Hiroyasu Nishi](#)

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[Gary Wiederrecht](#)

1859 [\(Invited\) Design of Plasmonic Catalysts Efficient H<sub>2</sub> Production from Hydrogen Storage Molecules](#)

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[Paul A. DeSario, Christopher N. Chervin, Eric S. Nelson, Megan B. Sassin, Debra R. Rolison](#)

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[Lionel Vayssieres](#)

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[Nianqiang \(Nick\) Wu](#)

[1866 \(Invited\) Chemical and Electronic Surface Structure of Compound Semiconductors for Solar Water Splitting](#)

[Clemens Heske](#)

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[Kazuhiko Maeda](#)

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[Mark Spitler](#)

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### **L03-Physical and Analytical Electrochemistry of Ionic Liquids 6**

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[Jean-Yves Sanchez, Priew Eiamlamai, Cristina Iojoiu, Laure Cointeaux, Cynthia Martinez-Cisneros](#)

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[Arianna Moretti, Stefano Passerini](#)

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## **L06-Fundamental Aspects of Electrochemical Conversion of Carbon Dioxide**

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[Beatriz Roldan](#)

[1966\(Invited\) Structure-Activity Relationships for CO and CO<sub>2</sub> Electroreduction to C<sub>2</sub> Species on Copper](#)

[Federico Calle-Vallejo](#)

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[Dominic R Alfonso, Douglas R. Kauffman, DeNyago Tafen, Christopher Matranga](#)

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[Peter Strasser](#)

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[Marc Robert](#)

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[Joaquin Rodriguez-Lopez](#)

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[Iwona Agnieszka Rutkowska, Pawel J Kulesza](#)

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[Aaron Timothy Marshall, Calvin F.C. Lim, Hani Taleshi Ahangari, David A. Harrington](#)

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[Dario Corradini, François-Xavier Coudert, Rodolphe Vuilleumier](#)

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[Olga A Baturina, Qin Lu, Andrew Purdy, Boris Dyatkin, Jan-Philip Grote, Serhiy Cherevko, Raymond R Unocic, Yury Gogotsi](#)

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[Andrew B. Bocarsly, James Pander, James White, Maor Baruch, Zachary Detweiler](#)

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[Adam Lewera, Maciej T. Gorzkowski, Rafal Robert Jurczakowski, Pawel J Kulesza](#)

[1978Electrocatalytic Reduction of Carbon Dioxide at Network Films of Metallic Centers Generated within Supramolecular Ligands](#)



[Anna Wadas, Malgorzata Frik, Iwona Agnieszka Rutkowska, Pawel J Kulesza](#)

1979 [Electrocatalytic Reduction of Carbon Dioxide on Tin Oxide-Based Nanoparticles: Indirect Detection of Formate Ions Via on-Line Dems](#)

[Mariana R. Camilo, Fabio H. B. Lima](#)

1980 [Tuning the Ligament Size and the Content of the Foreign Atom of the Nanoporous Copper for the Electrochemical Carbon Dioxide Reduction](#)

[Burkhard Hecker, Mehtap Oezaslan](#)

1981 (Keynote) [Oxide Semiconductors, Solid-State Chemistry, and Photoelectrochemistry: A Nexus](#)

[Krishnan Rajeshwar](#)

1982 (Invited) [Silicon Nanowires Photocathodes Combined with Mn-Based Molecular Complex Catalysts for the Efficient Light-Driven Electrocatalytic Reduction of CO<sub>2</sub> to CO](#)

[Bruno Fabre, Sylvie Chardon, Encarnacion Torralba-Penalver](#)

1983 (Invited) [Photo-Electrochemical CO<sub>2</sub> Reduction on Composite Metal and Metal-Oxide Cathodes](#)

[Jan Augustynski, Renata Solarska](#)

1984 [Photoelectrochemical Reduction of Carbon Dioxide at Copper\(I\) Oxide Modified with Ultra-Thin Polymer Layers](#)

[Ewelina Szaniawska, Krzysztof Bienkowski, Renata Solarska, Iwona Agnieszka Rutkowska, Krishnan Rajeshwar, Pawel J Kulesza](#)

1985 (Invited) [Role of Heterojunctions in Activation of CO<sub>2</sub> Molecule](#)

[Renata Solarska, Krzysztof Bienkowski](#)

[1986Mechanistic Insight into High Temperature CO<sub>2</sub> Electrolysis on Mixed Conducting Perovskite-Type Electrodes Revealed By in-Operando Photoelectron Spectroscopy](#)

[Andreas Nanning, Alexander Karl Opitz, Christoph Rameshan, Markus Kubicek, Thomas Götsch, Raoul Blume, Axel Knop-Gericke, Guenther Rupprechter, Bernhard Kloetzer, Juergen Fleig](#)

[1987Electrochemical Investigation of CO<sub>2</sub> Conversion Utilizing Nanoporous Polystyrene-Polyvinylpyridine Catalyst](#)

[Habte Ghebremichael, Alexander Sidorenko](#)

[1988Grain Boundary Effect in Electroreduction Catalysis for Renewable Energy Conversion](#)

[Xiaofeng Feng](#)

[1989Highly Active and Selective Au Thin Layer on Cu Polycrystalline Surface Prepared By Galvanic Displacement for the Electrochemical Reduction of CO<sub>2</sub> to CO](#)

[Wen Guo, Hyunje Woo, Yong-tae Kim](#)

[1990\(Keynote\) Formate/Formic Acid Synthesis from CO<sub>2</sub> Electroreduction Using Bi and Pb Nanostructures](#)

[Daniel Guay, Erwan Bertin, Mengyang Fan, Sebastien Garbarino, Ana Tavares, Claudie Roy, Sona Kazemi, Gianluigi A. Botton](#)

[1991\(Invited\) Carbon Dioxide Electroreduction at Ultrathin Palladium Layers Deposited on Copper Electrode](#)

[Rafal Robert Jurczakowski, Aneta Januszewska, Maciej Tomasz Gorzkowski, Adam Lewera, Pawel J Kulesza](#)

[1992Free Standing Nanoporous Pd Alloys As CO Poisoning Tolerant Electrocatalysts for the Selective Electrochemical Production of Formate from CO<sub>2</sub>](#)

[Swarnendu Chatterjee, Yawei Li, Joshua David Snyder](#)

1993 Hydrogen Bubble Templated Electrodeposited Cu As CO<sub>2</sub> Reduction Catalyst: Substrate Effect

Tintula Kottakkat, Katharina Klingan, Zarko P Jovanov, Arno Bergmann, Paul Kubella, Peter Strasser, Holger Dau, Christina Roth

1994 Bacterial Biofilm As Active Matrix for Catalytic Centers: Electroreduction of Carbon Dioxide

Ewelina Seta, Iwona Agnieszka Rutkowska, Pawel J Kulesza

1995 Bio-Electrocatalytic CO<sub>2</sub> Reduction into Formate Using Metal-Independent Formate Dehydrogenase from Candida Boidinii (Yeast)

Buddhinie Srimali Jayathilake, S. R. Narayanan

1996 Interplay of Mass Transfer and Local pH Effects in CO<sub>2</sub> Reduction Electrocatalysis

David Raciti, Chao Wang

1997 Linear and Non-Linear Impedance Spectroscopy of Composite Gadolinia-Doped Ceria and LSCM Perovskite: Deconvolution of CO<sub>2</sub> and H<sub>2</sub>O Co-Electrolysis

Jonathan Michael Witt, Eric M. Stuve, Stuart B. Adler

1998 A Comparison of Aqueous CO<sub>2</sub> Reduction on Ni-Ga Thin Films and Nanoparticles

Sonja A Francis, An T Chu, Daniel A Torelli, J Chance Crompton, Nathan S Lewis, Andrew B. Bocarsly

1999 Assessment of the Use of Switchable Polarity Solvents for Delivery of CO<sub>2</sub> for Electrochemical Reduction

Luis A. Diaz, Birendra Adhikari, Tedd E. Lister, Aaron D. Wilson, Eric J. Dufek

2000 Controllable Product Selectivity on Polycrystalline Cu through Tunable Surface Morphology

Alexandros N Karaiskakis, Elizabeth J Biddinger

2001 Electrode Characterization in a Flowing Electrolyte Reactor for the Electrochemical Reduction of CO<sub>2</sub> to CO

Steven Michael Brown, Yung Wei Hsiao, Michael Julian Orella, Fikile R. Brushett

2002 Nanoporous Cu Thin Films for Electrochemical CO<sub>2</sub> Reduction

Tyler D. Pounds, Ellen Benn, Chao Wang, Jonah Erlebacher

2003 Understanding Electrochemical Reduction of CO<sub>2</sub> Using Quantum Chemistry Modeling

Karthikeyan Saravanan, John A. Keith

2004 Analyzing the Electrochemically Catalytic Activity of Edge-Isolated MoS<sub>2</sub> Monolayer

Xiangye Liu, Baichang Li, Qianhui Qin, Emile Mottadecastro, James Hone, Daniel V Esposito

2005 Factors That Limit the Performance of CO<sub>2</sub> Electrolyzers

Hongzhou Yang, Zengcai Liu, Syed D. Sajjad, Yan Gao, Jerry J. Kaczur, Rich Masel

2006 Progress in Electrochemical CO<sub>2</sub> Reduction in Gas Phase – Design of Efficient Co-Electrolyser Systems

Alexandra Patru, Tobias Binniger, Thomas J. Schmidt

2007 Selectivity and Efficiency of Heat Treated Sputter Deposited Thin Films of Copper towards the Carbon Dioxide Electro-reduction

Anastasia A. Permyakova, Alexandra Patru, Juan Herranz, Thomas J. Schmidt

2008 Theoretical Investigations of Electrochemical CO<sub>2</sub> Reduction

[Karen Chan](#)

2009 [Carbon Based Atomic Catalysts for Carbon Dioxide Reduction](#)

[Jingjie Wu, Sichao Ma, Mingjie Liu, Paul J.A. Kenis, Pulickel M Ajayan](#)

2010 [In-Situ infrared Spectroscopic Investigations of Pyridine-Mediated CO<sub>2</sub> Reduction on Pt Electrocatalysts](#)

[Marco Dunwell, Yushan Yan, Bingjun Xu](#)

2011 [Enhanced Intermediate-Temperature CO<sub>2</sub> Splitting Using Non-Stoichiometric Ceria and Ceria-Zirconia](#)

[Zhenlong Zhao, Mruthunjaya Uddi, Nikolai Tsvetkov, Bilge Yildiz, Ahmed F. Ghoniem](#)

## **L07-Computational Electrochemistry**

2012 [\(Invited\) The Role of Interfacial Potentials in Fundamental Studies of Ion Solvation](#)

[Thomas Beck, Travis Pollard](#)

2013 [Implicit Solvation for Electrochemical Interfaces](#)

[Kathleen Schwarz, Kendra Letchworth-Weaver, Ravishankar Sundararaman](#)

2014 [Structure and Transport of “Water-in-Salt” Electrolytes from Molecular Dynamics Simulations](#)

[Oleg Borodin, Liumin Suo, Marco Olguin, Arthur v. Cresce, Jenel Vatamanu, Fei Wang, Xiaoming Ren, Joseph A. Dura, Antonio Faraone, Mallory Gobet, Stephen Munoz, Steven Greenbaum, Chunsheng Wang, Kang Xu](#)

2015 [Computational Study of the Effect of Surface-Bound Disulfide on the Oxygen Reduction Reaction](#)

[Thomas C Allison, YuYe Tong](#)

2016 [Oxygen Reduction Reaction Catalytic Sites on Carbon-Coated Fe<sub>3</sub>C Catalyst](#)

[Mateusz Reda, Heine A. Hansen, Tejs Vegge](#)

2017 [Density Functional Theory Studies of CO-Tolerant Stabilized Platinum Skin/Platinum Alloy Catalysts for the Hydrogen Oxidation Reaction](#)

[Donald A. Tryk, Hiroshi Yano, Guoyu Shi, Yoshiyuki Ogihara, Akihiro Iiyama, Hiroyuki Uchida](#)

2018 [Experimental and Computational Study on the Stability of Nitrogen, Boron, and Sulfur Doped Carbon Catalysts for Oxygen Reduction Reaction](#)

[Olga Naumov, Sergej Naumov, Bernd Abel, Aron Varga](#)

2019 [Theoretical Characterization of the Electronic and Optical Properties of Beryllium and Nitrogen Co-Doped Graphene: A Proposed P-Type Semiconductor for Nanoelectronic and Optoelectronic Applications](#)

[Okikiola Olaniyan, Edwin R Mapasha, Abubakar Abubakar Khaleed, Igumbor Emmanuel, Ncholu Manyala](#)

2020 [\(Invited\) Macroscopic Models of Ion-Nafion Interactions: Influence of Counter Ion Density on Network Morphology](#)

[Keith Promislow, Brian Wetton](#)

2021 [Analytical Models of Diffusive-Reactive Flow in 3-D Microstructural Networks to Guide the Design of Electrochemical Materials](#)

[Alex Cocco, Arata Nakajo, Wilson K. S. Chiu, Kyle N. Grew](#)

2022 [Modeling the in Situ Ionic and Electronic Conductivity of the Porous Electrodes Linked to the Oxidation-Reduction Reactions in Solid Oxide Fuel Cells](#)

[Tian-Le Cheng, Yinkai Lei, You-Hai Wen](#)

2023 [Doping Amorphous Ti Oxides to Decrease Oxygen Reduction Rates](#)

[Mitchell C. Groenenboom, John A. Keith](#)

2024 [Reactive Molecular Dynamics Modeling of Iron Passivity](#)

[Hossein DorMohammad, Qin Pang, Líney Árnadóttir, O. Burkan Isgor](#)

2025 [Atomistic Simulations of Lithium Ion Mobility in Battery Electrolytes](#)

[Jeffrey M Sanders, Shaun H Kwak, Caroline M Krauter, Jacob Gavartin, Sudharsan Pandiyan, Tsuguo Morisato, Andrea R Browning, Mathew D Halls](#)

2026 [Understanding and Tailoring the Performance of Transition Metal Oxides for the Oxygen Evolution Reaction](#)

[Vladimir Tripkovic, Heine A. Hansen, Juan Maria Garcia Lastra, Tejs Vegge](#)

2027 (Invited) [Toward Design Principles for Anion Exchange Membranes with High Hydroxide Conductivity](#)

[Mark E. Tuckerman, Tamar E. Zelovich, Zhuoran E. Long](#)

2028 [Understanding and Designing Novel H<sup>-</sup> Ionic Conductors Based on First Principles Calculations](#)

[Qiang Bai, Yifei Mo](#)

2029 [Dissipative Particle Dynamics Simulations of Anion Exchange Membranes](#)

[Xubo Luo, Fatemeh Sepehr, Stephen J. Paddison](#)

2030 [Theoretical Investigations on Proton Conductance and Degradation Mechanisms of Nafion Membrane in Fuel Cells](#)

[Takao Tsuneda, Raman Kumar Singh, Keiji Kunimatsu, Akihiro Iiyama, Kenji Miyatake](#)

2031 [Density Functional Theory Study of the Interactions of OH and Cl with the Pristine and Defective Surfaces of  \$\alpha\$ -Fe<sub>2</sub>O<sub>3</sub> \(0001\)](#)

[Qin Pang, Hossein DorMohammad, O. Burkan Isgor, Líney Árnadóttir](#)

[2032\(Invited\) Fick's II Law and Deploying Spatially Varying Diffusion Coefficients on Electrodes](#)

[Krysti L. Knoche, Jeffrey Landgren, Johna Leddy](#)

[2033Simultaneous Optimization Approach for Optimal Electrode Design of Lithium-Ion Batteries](#)

[Yanbo Qi, Jerry Chen, Suryanarayana Kolluri, Manan Pathak, Daniel T. Schwartz, Venkat R. Subramanian](#)

[2034Parametric Study and Mathematical Modeling of the Hydrogen Evolution Reaction: Application to Mildly Acidic Environments Containing Acetic Acid on a Gold Surface](#)

[Aria Kahyarian, Srdjan Nestic](#)

[2035The Impedance Analyzer: An Open-Source, Web-Based Tool for Sophisticated Interrogation of Experimental EIS Spectra](#)

[Matthew D. Murbach, Victor Waiman Hu, Daniel T. Schwartz](#)

[2036An Open-Source Data Science Platform for the Electrochemical Community](#)

[Robert Masse](#)

[2037Phase-Field Modeling of the Thermal Growth of an Oxide Film and the Electrochemical Performance of a Solid Oxide Fuel Cell: Similarities and Differences](#)

[Tian-Le Cheng, You-Hai Wen, Jeffrey A. Hawk](#)

[2038Theoretical Investigation of Vanadium Crossover Phenomena through Different Types of Membrane in Vanadium Redox Flow Battery](#)

[Daein Jeong, Seunghun Jung](#)



[2039 Use of Kissa Software for Accurate Simulation of Electrochemical Problems of Any Complexity](#)

[Irina Svir, Oleksiy Klymenko, Alexander Oleinick, Christian Andre Amatore](#)

### **L08-Advanced Techniques for In Situ Electrochemical Systems**

[2040 \(Invited\) In Situ FTIR Reflection Spectroscopy and Its Applications](#)

[Zhi-You Zhou, Jun-Tao Li, Yan-Xia Jiang, Shi-Gang Sun](#)

[2041 Resistance Values of Aluminum Oxide Film in Situ during Anodization of Aluminum By Fabry-Pérot Interferometry](#)

[Khaled Habib](#)

[2042 Stationary Probe Rotating Disk Electrode for in Situ Dissolution Studies](#)

[Pietro Papa Lopes, Dusan Strmcnik, Vojislav Stamenkovic, Nenad M Markovic](#)

[2043 \(Invited\) Visualizing Electrochemical Reactions at the Nanoscale By in-Situ TEM](#)

[Huolin L. Xin, Mingyuan Ge, Yong S Chu](#)

[2044 Utilizing in Situ Ec-S/TEM to Study Electrochemical Nucleation of Copper from a Bromide Electrolyte](#)

[Elizabeth A. Stricker, Jesse S. Wainright, Robert F. Savinell, Raymond R Unocic](#)

[2045 Scanning Electrochemical Microscopy and Optical Microscopy for in Situ Investigations of Diffusion Layer Chemistry during Electrodeposition](#)

[Nicole L. Ritzert, Thomas P. Moffat](#)

[2046 Real Time Observation of Electrochemical Deposition Process of Zinc Dendrites Via Correlative Optical and X-Ray Microscopy](#)

[Jeung Hun Park, Abhishek Raj, Tanya Gupta, Daniel A Steingart](#)

[2047\(Invited\) In Situ Electrochemical STEM As a Platform for Interpreting Electrochemical Phenomena](#)

[Raymond R Unocic, Robert L Sacci, Xiahan Sang, Kinga A Unocic, Gabriel M Veith, Nancy J Dudney, Karren L. More](#)

2048[Nanoscale Electrochemistry Via Lithium Focused Ion Beam](#)

[William R. McGehee, Evgheni Strelcov, Jamie Gardner, Saya Takeuchi, Oleg A. Kirillov, Vladimir P. Oleshko, David J. Gundlach, Christopher L. Soles, Nikolai Zhitenev, Jabez J. McClelland](#)

2049[How in Situ Analytics Advances Our Understanding of Electrocatalytic Materials and Reaction Processes – a Few Case Studies](#)

[Peter Strasser](#)

2050(Invited) [In-Operando Synchrotron X-Ray Computed Tomography for Electrochemical Energy Conversion and Storage](#)

[Iryna V. Zenyuk](#)

2051[X-Ray Tomography and Thermography Investigation of a High-Modulus Solid Electrolyte for All Solid-State Batteries](#)

[Natalie Seitzman, Steve Johnston, Heather A.S. Platt, Steve Harvey, Seoung-Bum Son, Iryna V. Zenyuk, Mowafak Al-Jassim, Svitlana Pylypenko](#)

2052[In-Situ Solid-State Electrochemistry of Well-Defined Electrode-Electrolyte Interfaces Using Ion Soft Landing](#)

[Venkateshkumar Prabhakaran, Grant Johnson, Julia Laskin](#)

2053[Chemical and Structural Investigation of Pt-Ni Extended Surface Catalyst Electrodes](#)

[Sarah M Shulda, Johanna Nelson Weker, Chilan Ngo, Scott A Mauger, Shaun M Alia, K.C. Neyerlin, Bryan S Pivovar, Svitlana Pylypenko](#)

2054 Broadband Sum-frequency Generation Spectroscopy Study of Electrochemical Surface Processes

Zhi-Chao Huang-Fu, Yu-Han He, Zhi-You Zhou, Zhao-Hui Wang, Shi-Gang Sun

2055 (Invited) Ambient Pressure XPS: Revealing Elemental, Chemical, and Potential Information across a Wide Range of Electrochemical Systems

Ethan J Crumlin

2056 Investigation of Model N-C and Fe-N-C Oxygen Reduction Catalysts Under in Situ Conditions

Michael Dzara, Kateryna Artyushkova, Chilan Ngo, Matthew B Strand, Jamie Hagen, Svitlana Pylypenko

2057 Observation of Oxygen Binding on PGM-Free Electrocatalysts By Ambient Pressure XPS and XAS

Kateryna Artyushkova, Elisabeth Weiler, Michael J. Dzara, Svitlana Pylypenko, Barr Zulevi, Frederic Jaouen, Plamen Atanasov

2058 (Invited) Understanding Electrocatalytic Pathways in Complex Organic and Inorganic Composites in Aqueous and Non-Aqueous Environments

Sanjeev Mukerjee

2059 In Situ X-Ray Absorption Spectroscopy Investigation of Silver-Copper Nanoparticles for the Oxygen Reduction Reaction

Brenna M. Gibbons, Drew Christopher Higgins, Melissa Wette, Apurva Mehta, Ryan C. Davis, Bruce M. Clemens, Thomas F Jaramillo

2060 Operando Grazing Incidence X-Ray Diffraction and X-Ray Absorption Spectroscopy for Electrochemical CO<sub>2</sub> Reduction on AuPd, Pd and Au Electrodes

Alan Taylor Landers, Jeremy T Feaster, Maryam Farmand, John Lin, Sean Fackler, Drew Christopher Higgins, Yusaku Nishimura, Ryan C. Davis, Apurva Mehta, Christopher Hahn, Junko Yano, Thomas F Jaramillo, Walter Drisdell

[2061](#)[Elucidating the Pre-Oxygen Evolution Surface Chemistry on Ruthenium Dioxide Surfaces](#)

[Reshma R Rao, Manuel J Kolb, Niels Halck, Anders Filsø Pedersen, Apurva Mehta, Hoydoo You, Kelsey A. Stoerzinger, Heine A. Hansen, Zhenxing Feng, Hua Zhou, Jan Rossmeisl, Tejs Vegge, Ib Chorkendorff, Ifan Erfyl Lester Stephens, Yang Shao-Horn](#)

[2062](#)[In-Situ Gracing Incidence X-Ray Diffraction Cell for Electrochemically Formed Thin Films](#)

[Sabine Reither, Werner Artner, Andreas Eder, Silvia Larisegger, Michael Nelhiebel, Christoph Eisenmenger-Sittner, Günter Fafilek](#)

### **L09-Multi-electron Redox Systems for Next Generation Batteries**

[2063](#)[\(Invited\) Benefits of Borohydride- and Glyme-Containing Electrolytes for Improved Magnesium Anode Behavior](#)

[Daniel A Buttry, Ashok Kumar](#)

[2064](#)[\(Invited\) Structure-Function Relationships in Electrolytes for Reversible Magnesium Batteries](#)

[Bart M. Bartlett](#)

[2065](#)[\(Invited\) A New Class of Fluorinated Alkoxyaluminate Electrolytes for Magnesium-Ion Batteries](#)

[Jake Tompkins Herb, Carl Nist-Lund, Craig B. Arnold](#)

[2066](#)[\(Invited\) Electrodeposition and Development of Mg and Ca Metal Anodes](#)

[Alexandre Ponrouch](#)

[2067](#)[\(Invited\) Investigating the Water-Stimulated Mg<sup>2+</sup> Insertion Mechanism in an Electrodeposited MnO<sub>2</sub> Cathode](#)

[Emily Sahadeo, Jaehee Song, Karen J. Gaskell, Gary W Rubloff, Sang Bok Lee](#)

[2068\(Invited\) Electrochemical Energy Storage of Magnesium in Hydrated and Anhydrous Tungsten Oxides](#)

[Ruocun Wang, Veronica Augustyn](#)

[2069\(Invited\) On the Balance of Intercalation and Conversion Reactions in Battery Cathodes](#)

[Daniel C. Hannah, Gopalakrishnan Sai Gautam, Pieremanuele Canepa, Gerbrand Ceder](#)

[2070Crystal Structure Analysis and Mg Battery Cathode Properties of Delithiated  \$\text{Li}\_{1-x}\text{Ni}\_{0.5}\text{Mn}\_{0.5}\text{O}\_2\$  with Layered Rock-Salt Structure](#)

[Naoya Ishida, Naoto Yamazaki, Naoto Kitamura, Yasushi Idemoto](#)

[2071\(Keynote\) Transition Metal Sulfides As Intercalation Cathode Materials for Rechargeable Aluminum Batteries](#)

[Linxiao Geng, Juchen Guo](#)

[2072\(Invited\) Capabilities and Opportunities for Next-Generation Ag-3D Zn Batteries](#)

[Joseph F. Parker, Jesse Ko, Debra R. Rolison, Jeffrey W. Long](#)

[2073\(Invited\) Effect of Ni:Fe Stoichiometry and Architectural Expression on the Bifunctional Activity of Nanoscale  \$\text{Ni}\_y\text{Fe}\_{1-y}\text{O}\_x\$](#)

[Jesse S. Ko, Christopher N. Chervin, Mallory Vila, Paul A. DeSario, Joseph F. Parker, Jeffrey W. Long, Debra R. Rolison](#)

[2074\(Keynote\) Electrolyte Design for High Energy Density Li-S Batteries](#)

[Kevin R Zavadil](#)

[2075\(Invited\) Multivalent Metal/Sulfur Chemistries for High Energy Density Rechargeable Batteries](#)

[Tao Gao, Chunsheng Wang](#)

[2076\(Keynote\) In-Situ Synthesis of Compact Li<sub>2</sub>S@Graphene Nanocapsules for High Performance Li-S Batteries](#)

[Guoqiang Tan, Rui Xu, Zhenyu Xing, Yifei Yuan, Jianguo Wen, Cong Liu, Lu Ma, Tianpin Wu, Jun Lu, Xiulei Ji, Khalil Amine](#)

[2077\(Invited\) Redox Chemistry of Li-Sulfur Batteries Investigated Via Electrochemistry, X-Ray Photoelectron Spectroscopy and Electron Paramagnetic Resonance](#)

[Svetlozar Ivanov, Sebastian Mai, Andreas Bund, Anna Dimitrova, Stefan Krischok](#)

[2078\(Invited\) Metal-Organic Framework-Derived Electrocatalysts for Li-O<sub>2</sub> Batteries](#)

[Jun Lu, Guoqiang Tan, Khalil Amine](#)

[2079\(Keynote\) Redox Catalysis for Redox Flow Lithium-Oxygen Battery](#)

[Qing Wang](#)

[2080\(Invited\) Lithium Metal Batteries Using 3D Ionic or Electronic Frameworks](#)

[Liangbing Hu](#)

[2081Cobalt Complexes As Single Redox Molecules for Catholyte and Anolyte in Redox Batteries](#)

[Georgios Nikiforidis, Chunzhen Yang, Yong Luo, Zhaomin Hou, Hye Ryung Byon](#)

[2082\(Invited\) Multi-Electron Reduction of Perfluorinated Gases: The 8-Electron Sulfur Hexafluoride System As a Model Reaction](#)

[Yuanda Li, Aliza Khurram, Mingfu He, Betar M. Gallant](#)

[2083Multifunctional Pyridinium Systems for Nonaqueous Redox Flow Batteries](#)

[Thomas F. Guarr, Anthony Petty, Kevin Olson, Shane Mann](#)

[2084Crystal and Electronic Structures of MgCo<sub>2-x</sub>Mn<sub>x</sub>O<sub>4</sub> As Cathode Material for Magnesium Secondary Battery Using First Principle Calculation and Quantum Beam](#)

[Chiaki Ishibashi, Yusuke Mizutani, Naoya Ishida, Naoto Kitamura, Yasushi Idemoto](#)

### **M01-Sensors, Actuators and Microsystems General Session**

[2085\(Invited\) Decoding Multi-Gas Mixtures Using a Mixed-Potential Sensor Array for Vehicular Emission Monitoring](#)

[Kannan Pasupathikovil Ramaiyan, Unab Javed, Cortney R. Kreller, Eric L. Brosha, Alexandre Morozov, Rangachary Mukundan](#)

[2086Nanoelectrode Arrays for in-Situ Identification and Quantification of Halogen Ions](#)

[Kyle Christopher Klavetter, W. Graham Yelton, Carlos R. Perez, Michael P. Siegal](#)

[2087Solid-State Electrochemical Bidirectional Alkali Vapor Source for Cold Atom Microsystems](#)

[Songbai Kang, Russell P. Mott, Kevin A. Gilmore, Logan D. Sorenson, Matthew T. Rakher, Elizabeth A. Donley, John Kitching, Christopher S. Roper](#)

[2088Rapid Detection of Toxic Heavy Metals with Boron-Doped Diamond Sensors](#)

[Cory Allen Rusinek, Michael F Becker, Mary Ensck, Robert Rechenberg, Aaron Hardy, Bettina Wehring, Thomas Schuelke](#)

[2089A Simple and Fast Analysis of LSD By Cyclic Voltammetry in Aqueous Medium](#)

[Marcelo Firmino de Oliveira, Erica Naomi Oiye, Maria Fernanda Muzetti Ribeiro, Juliana Midori Toya Katayama](#)

[2090Nested ZnO Nanostructure Gas Sensor with AZO Coating By Atomic Layer Deposition](#)

[Pengtao Lin, Xin Chen, Kai Zhang, Helmut Baumgart](#)

[2091 Electrochemical Detection of Sulfanilamide at MWCNT Coated Conducting Polymer Modified Electrode](#)

[Shirinaz I Khan, Rakesh Chillawar, Pradesh Digal, Ramani V Motghare](#)

[2092 Exploration of New Two Dimensional Titanium Carbides for Room Temperature Gas Sensors](#)

[Eunji Lee, Armin Vahid Mohammadi, Doohee Lee, Jaesik Yoon, Christopher Lincoln, Majid Beidaghi, Sungpil Woo, Youngsoo Yoon, Dong-Joo Kim](#)

[2093 \(Invited\) Preparation and Pore Structure of Glucose-Derived Porous Carbon Electrodes](#)

[Gang Li, Xiaozhuan Gao, Tingyu Li, Qinghua Zhao, Yingge Wang, Kaiying Wang](#)

[2094 Fabrication of Shaped Controlled Cerium Oxide Nanomaterial for Highly Sensitive Enzymatic Glucose Biosensors](#)

[Ahmad Mohammadhabeeb Fallatah, Mohammed Almomtan, Sonal Padalkar](#)

[2095 A Paper-Based Surface-Enhanced Raman Scattering Test Strip for Protein Biomarker Detection](#)

[Xuefei Gao, Peng Zheng, Sujan Kasani, Nianqiang Wu](#)

[2096 Towards Next Generation Body Worn Glucose Sensors](#)

[Maryam Salari, Andy Fan, Allison Dennis, Catherine Klapperich, James Galagan, Mark W Grinstaff](#)

[2097 Textile Fiber Electrode to Monitor Uric Acid and for Assessing Wound Chronicity](#)

[Michelle Pierre, Sohini RoyChoudhury, Yogeswaran Umasankar, Pandiaraj Manickam, Renny E Fernandez, Norman Munroe, Shekhar Bhansali](#)

[2098 Preparation and Characterization of Electrochemical Tyrosinase Biosensor](#)



[Ilker Polatoglu](#)

2099 [An Au-\[Fe-S\]-NAD-Glucose Dehydrogenase Bioanode for Glucose Detection](#)

[Aishwarya Mahadevan, Sandun Fernando](#)

2100 [Sonochemically Synthesized Zinc Oxide Nanoflakes Based Electrochemical Immunosensor for Ethyl Glucuronide \(EtG\) Detection](#)

[Fahmida Alam, Raju Sinha, Ahmed Hasnain Jalal, Pandiaraj Manickam, Phani Kiran Vabbina, Shekhar Bhansali, Nezh Pala](#)

2101 [Enhanced Protein Stability Using Room Temperature Ionic Liquid for Wearable Electrochemical Sweat-Based Biosensor](#)

[Badrinath Jagannath, Sriram Muthukumar, Rujuta D. Munje, Shalini Prasad](#)

2102 (Invited) [Electrochemical Characterization of Nanogap Interdigitated Electrode Arrays for Lab-on-a-Chip Applications](#)

[Volha Matylitskaya, Stefan Partel](#)

2103 [Label Free Detection of Gene Mutation by Applying a  \$Ce\_2\(Zr\_{1-x}Ti\_x\)O\_y\$  Sensing Film Based Electrolyte – Insulator – Semiconductor \(EIS\) Biosensors Using Sol-Gel Method](#)

[Sankar Prasad Bag, Prabir Garu, Kanishk Singh, Bih Show Lou, Jim Long Her, Tung Ming Pan](#)

2104 [All Organic Screen Printed Electrodes for Continuous Recording of Electrocardiogram](#)

[Sneh Kumar Sinha, Yeonsik Noh, Gregory Martin Treich, Natasa Reljin, Shirin Hajeb-Mohammadalipour, Ki Chon, Gregory Allen Sotzing](#)

2105 [Development of Nanomaterial Modified Sensor for the Electrocatalytic Oxidation of Non-Steroidal Anti-Inflammatory Drug](#)

[Pravin Tarlekar, Sanghamitra Chatterjee](#)

[2106 Stress Detection Using Polymer Optical Fiber with FRET Pair Dyes](#)

[Rei Furukawa, So Kamimura](#)

[2107 Non-Enzymatic Urea Detection Via Using Ag/ZnO Nanorod-Based Catalyst](#)

[Jaesik Yoon, Eunji Lee, Doohee Lee, Tae-Sik Oh, Sung Pil Woo, Young Soo Yoon, Dong-Joo Kim](#)

[2108 Simple Solution Deposition of  \$\text{Co}\_3\text{O}\_4\$  on FTO for Rapid and Selective Nonenzymatic Glucose Detection](#)

[Mahabubur Chowdhury, Maelsand Aliwa](#)

[2109 Fabrication of Hierarchical Nanostructures for Surface-Enhanced Raman Scattering Biosensors](#)

[Kathrine Curtin, Sujan Kasani, Peng Zheng, Nianqiang Wu](#)

[2110 Carbon Monoxide Gas Sensing Study Using Hydrothermally Prepared NiO/Graphene Nanosheets Electrode](#)

[Abubakar Abubakar Khaleed, Abdulhakeem Bello, Julien Koudio Dangbegnon, Okikiola Olaniyan, Bonex W. Mwakikunga, Ncholu Manyala](#)

[2111 Electrically Conductive Polymer Nanocomposites for 3D Printing](#)

[Shunsuke Takeda, Ajit Khosla, Masataka Sugimoto, Hidemitsu Furukawa, Sathish K. Sukumaran](#)

[2112 Synthesis and Characterization of NiO Nanostructures Formed By Anodization Sonochemical. Its Application As Non-Enzymatic Glucose Sensor](#)

[Ricardo Silvio Schrebler, Paula Grez, Cristopher Alejandro Heyser](#)

[2113 3D Printing of Micromolds and Microfluidic Devices](#)

[Kyuichiro Takamatsu, Samiul Basher, Sun He, Kei Sato, Kazunari Yoshida, Kazuyuki Sakai, Masaru Kawakami, Hidemitsu Furukawa, Tsukasa Yoshida, Ajit Khosla](#)

2114 [Ultrasonically Assisted Preparation of Carbon Fiber Doped Electrically Conductive Micropatternable Nanocomposite Polymer for MEMS/NEMS Applications](#)

[Samiul Basher, He Sun, Yuji Hirai, Kazuyuki Sakai, Kazunari Yoshida, Hidemitsu Furukawa, Sathish K. Sukumaran, Tsukasa Yoshida, Ajit Khosla](#)

2115 [Fabrication of Aptamer-Immobilized Multi-Target Field-Effect Transistor Biosensor for Sensing Mental Stress](#)

[Shigeki Kuroiwa, Ryota Takibuchi, Akane Matsuzaka, Sho Hideshima, Naoto Kaneko, Hirotaka Minagawa, Katsunori Horii, Iwao Waga, Takuya Nakanishi, Keishi Ohashi, Toshiyuki Momma, Tetsuya Osaka](#)

2116 [Resistive Hysteresis of Carbon Nanofiber Doped Elastomeric Nanocomposite Polymer](#)

[Ajit Khosla, Hidemitsu Furukawa, Sathish K. Sukumaran](#)

## **M02-Practical Implementation and Commercialization of Sensors 2**

2117 [\(Invited\) Wearable Sensor Systems for Long Term Health and Environmental Monitoring](#)

[Veena Misra](#)

2118 [\(Invited\) Advancing Convergence and Innovation in Cancer Research: National Cancer Institute Center for Strategic Scientific Initiatives \(CSSI\)](#)

[Michelle Anne Berny-Lang, Sean Erik Hanlon, Jerry Ssu-Hsien Lee](#)

2119 [\(Invited\) Bridging the Gap for the Commercialization of the First Mobile Metabolism Tracker](#)

[Erica Forzani](#)

2120(Invited) Commercialization of Novel Electrochemical Sensors for Volatile Organics

Werner Kuhr, Craig Rhodine

2121(Invited) Design and Commercialization Challenges of Garment-Based Textile Electronics

Jesse S Jur, Allison Bowles, Raj Bhakta, Amanda Myers, Hasan Shahariar, Jack Twiddy

2122(Invited) Enabling Global Impact of Amperometric Gas Sensors

Joseph R Stetter, Michael T Carter, Melvin W Findlay

2123(Invited) Field Trials Testing of Mixed Potential Electrochemical Hydrogen Safety Sensors at Commercial California Hydrogen Filling Stations

Eric L. Brosha, Christopher J. Romero, Daniel Poppe, Todd L. Williamson, Cortney R. Kreller, Rangachary Mukundan, Robert S. Glass, Amanda S. Wu

2124A Wearable Electrochemical Sensor to Monitor Progression of Wound Healing

Sohini RoyChoudhury, Yogeswaran Umasankar, Shekhar Bhansali

2125A Three-Electrode Mixed-Potential Electrochemical Sensor for NO<sub>x</sub>/NH<sub>3</sub> Automotive Exhaust Gas Analysis

Lok-kun Tsui, Angelica D Benavidez, Ponnusamy Palanisamy, Lindsey Evans, Fernando H Garzon

2126(Invited) Intelligent Innovation in the Water Sector. Opportunities and Challenges in Sensor Design for the Drinking and Wastewater Markets

Dan Kroll, Corey Salzer, Russ Young, Vishnu Rajasekharan

2127(Invited) Convergence between Academic and Industrial Research: Practical Implementation in Commercialization of Sensors

[Larry A Nagahara](#)

2128([Invited](#)) [Chemical Sensor Commercialization: Examples from Printed Amperometric Sensors](#)

[Michael T Carter, Joseph R Stetter, Melvin W Findlay](#)

2129[Enhanced Optical Coated Witness Plates for the in Situ Monitoring of Spacecraft Health](#)

[Gugu N Rutherford, Elaine E Seasley, Mark N Thornblom, Irving Cashwell, Messaoud Bahoura](#)

2130A [Fuel Cell Sensing Platform for Selective Detection of Acetone in Hyperglycemic Patients](#)

[Ahmed Hasnain Jalal, Yogeswaran Umasankar, Mustahsin Chowdhury, Shekhar Bhansali](#)

2131[Long Term Performance of Amperometric Gas Sensors Outside the Lab](#)

[Michael T Carter, Melvin W Findlay, Joseph R Stetter, Lloyd Ploense, Bennett J. Meulendyk, Vinay Patel, Gavin O'Toole, William Escobar](#)

## **OC-ECS OpenCon 2017: Exploring Ideas for Next Generation Research**

2132([Keynote](#)) [The Importance of Open Science in a Changing Scholarly Communications Paradigm](#)

[Ashley Farley](#)

2133[Free the Science Overview and Update](#)

[E. J Taylor](#)

2134[Open Science](#)

[Brian Nosek](#)

2135 [Open Access](#)

[Nick Shockey](#)

2136 [Open Your Data](#)

[Meredith Morovati](#)

2137 [Open and Government](#)

[Dina Paltoo](#)

2138 [Open and Academia: Datasets and Tools to Accelerate Electrochemical Science and Engineering](#)

[D. T. Schwartz](#)

### **Z01-General Student Poster Session**

2143 [Electrochemical Properties of Single Grain-Boundary and Pit Initiation Sites of Sensitized Stainless Steel](#)

[Noriyuki Ida, Izumi Muto, Yu Sugawara, Nobuyoshi Hara](#)

2144 [Relationship between Ionic Interaction and NMR Relaxation Behavior in LiClO<sub>4</sub>-PC Solution Coexisting with Fumed Metal Oxide](#)

[Marie Takemoto, Hideshi Maki, Masaki Matsui, Minoru Mizuhata](#)

2145 [Physicochemical Properties of Dialkyl Ethers](#)

[Noritoshi Nambu, Shohei Suzuki, Masaru Ogasawara](#)

2146 [Detection of Absorbed Hydrogen into Pure Iron By TiO<sub>2</sub> Thin Film](#)

[Tsubasa Sato, Yu Sugawara, Izumi Muto, Nobuyoshi Hara](#)

[2147 Post Synthesis Treatment of Tunnel Manganese Oxide Nanowires for Improved Electrocatalytic Activity in Oxygen Evolution Reactions \(OER\)](#)

[Patrick Joseph West, Bryan Byles, Ekaterina Pomerantseva](#)

[2148 Co, N-Doped Carbon Nanomaterial As a High-Performance Catalyst for Oxygen Reduction Reaction](#)

[Rani Zierath, Wenyue Li, Shouzhong Zou](#)

[2149 Investigation of the Role That Bulk Electrolysis Conditions Play in the Evaluation of New Energy Storage Materials](#)

[Jeffrey A Kowalski, Fikile R. Brushett](#)

[2150 Synthesis of Nanoscale  \$\text{Li}\_7\text{La}\_3\text{Zr}\_2\text{O}\_{12}\$  Solid State Electrolyte By Spray Drying](#)

[Md-Jamal Uddin, Alla R Letfullina, Pankaj Kumar Alaboina, Jong-Soo Cho, Sung-Jin Cho](#)

[2151 Nanoporous Electrospun  \$\text{Li}\_7\text{La}\_3\text{Zr}\_2\text{O}\_{12}\$  As Filler in PEO/Litfsi Hybrid Electrolyte](#)

[Alla R Letfullina, Md-Jamal Uddin, Jong-Soo Cho, Pankaj Kumar Alaboina, Sung-Jin Cho](#)

[2152 Ionic Liquid Enhanced Polymer Elctrolytes for Environmental Friendly Electric Double Layer Capacitors](#)

[Katherine Anne Francis, Chiam wen Liew, K Ramesh, Subramaniam Ramesh, S Ramesh](#)

[2153 Soft Materials for the Lithium-Air Battery Electrode](#)

[Emily Margaret Gould, Paul S Clegg](#)

[2154 Carbon Nitride-Based Hollow Sphere As Polysulfides-Shuttle Restricting Host for Lithium Sulfur Battery](#)

[Zhen Meng, Hangjun Ying, Weiqiang Han](#)

[2155Uniform Distribution of Sn Nanoparticles in Carbon Matrix As Anodes for High-Performance Lithium-Ion Batteries](#)

[Weiqliang Han, Hangjun Ying, Fengxia Xin](#)

[2156The Synthesis and Application of LlzO Ultrathin Electrolyte Film](#)

[Xufeng Yan, Zhuobin Li, Weiqliang Han](#)

[2157Fundamental Electrochemical Study of Manganese Redox States in Nonaqueous Battery Solvents](#)

[Oliver Clyde Harris](#)

[2158Smooth Li Electrodeposition on Single Crystal Cu Current Collectors](#)

[Kohei Ishikawa, Yasumasa Ito, Shunta Harada, Miho Tagawa, Toru Ujihara](#)

[2159Hybrid Battery System to Achieve High Power and High Energy for Automotive Applications](#)

[Huiseok Kim, Seunghun Jung](#)

[2160Solvothermal Preparation of Microspherical Flowerlike Ni\(OH\)<sub>2</sub>/Graphene Oxide Electrode for Electrochemical Capacitor Application](#)

[Abubakar Abubakar Khaleed, Abdulhakeem Bello, Julien Koudio Dangbegnon, Okikiola Olaniyan, Bonex W. Mwakikunga, Ncholu Manyala](#)

[2161Structure and Electrochemistry of Chromium Substituted Lithium Vanadyl Phosphate for Lithium-Ion Batteries](#)

[Krystal Lee, Carrie Siu, Youngmin Chung, Natasha A. Chernova, Fredrick Omenya, M. Stanley Whittingham, Yuh-Chieh Lin, Shyue Ping Ong](#)

[2162Functional Carbon Surfaces for Stable Sodium-Ion SEI Formation](#)

[Sophia Lee, Maureen Tang](#)



[2163 Mechanical Modeling of Agglomerate in Lithium-Ion Battery Electrodes](#)

[Bin Wu, Wei Lu](#)

[2164 Structure-Property-Process Relationships of Melt-Blown PVDF: A Potential Li-Ion Battery Separator](#)

[Salvatore Luiso, Peter S Fedkiw, Richard J Spontak, Behnam Pourdeyhimi](#)

[2165 Synthetic Control of Manganese Birnessite: Impact of Crystallite Size on Li, Na, and Mg Based Electrochemistry](#)

[Jiefu Yin, Esther S Takeuchi, Kenneth J Takeuchi, Amy C Marschilok](#)

[2166 Improvement of Rate Performance of LiFePO<sub>4</sub> Cathode with Porous LiFePO<sub>4</sub>/Activated Carbon Hybrid Electrode Structure](#)

[Takashi Tsuda, Nobuo Ando, Takao Gunji, Toyokazu Tanabe, Shingo Kaneko, Kaoru Itagaki, Naohiko Soma, Susumu Nakamura, Futoshi Matsumoto](#)

[2167 Synthesis of Water-Resistant thin TiO<sub>x</sub> Layer-Coated High-Capacity LiNi<sub>a</sub>Co<sub>b</sub>Al<sub>1-a-b</sub>O<sub>2</sub> \(a > 0.85\) Cathode and Its Stable Charge/Discharge Cycle Cathode Performance to Apply a Water-Based Hybrid Polymer Binder to Li-Ion Batteries](#)

[Yubin Liu, Toyokazu Tanabe, Koki Miyamoto, Yuta Irii, Fumihiko Maki, Takao Gunji, Shingo Kaneko, Shinsaku Ugawa, Hojin -J Lee, Takeo Ohsaka, Futoshi Matsumoto](#)

[2168 Improvement of Charge/Discharge Capacity of Lithium-Air Battery Using Porous Carbon Nanotube Electrode](#)

[Masamichi Matsumoto, Masato Eguchi, Tatsumi Ishihara, Tsuyohiko Fujigaya](#)

[2169 Dependence of Double Layer Capacitance on Pore Diameter of Carbon Coated Porous Si](#)

[Yutaka Takiguchi, Hideshi Maki, Minoru Mizuhata](#)

[2170 Electrochemical and Chemical Stability of Solid Electrolyte–Electrode Interfaces: A First Principles Computation Study](#)

Yizhou Zhu, Xingfeng He, Yifei Mo

2171 Development of Rechargeable Metal Hydride/Air Laminate Cell

Shizuki Kino, Kenji Kawaguchi, Masatsugu Morimitsu

2172 Importance of Electronic Conductivity in the Reversibility and Rate Capability of Metal Oxide Lithium Battery Anodes

Alessandro Palmieri, Benjamin Ng, Alexandra Oliveira, William E. Mustain

2173 Crystal Structure Analysis of Electrochemically Magnesiated  $Mg_xLi_{0.1}Mn_{0.54}Ni_{0.13}Co_{0.13}O_2$

Ryuta Nishigami, Naoya Ishida, Naoto Kitamura, Yasushi Idemoto

2174 The Design and Investigation Zinc-Air Flow Battery with Automatic Control System

Jingyu Si, Dong Zheng, Gongwei Wang, Dan Liu, Joshua Harris, Deyang Qu

2175 Synthetic Control of Crystallite Size of Silver Vanadium Phosphorous Oxide ( $Ag_{0.50}VOPO_4 \cdot 1.9H_2O$ ): Impact on Electrochemistry

Matthew M. Huie, Esther S Takeuchi, Kenneth J Takeuchi, Amy C Marschilok

2176 Investigation of the Porosity and Tortuosity of Silicon-Graphite Electrodes in Lithium-Ion Batteries

Morten Wetjen, Daniel Pritzl, Stefan Niesen, Hubert A. Gasteiger

2177 Enhanced Cycle Performance of  $MnO_2$  Supercapacitors By Ultrasonic-Assisted Electrodeposition

Cheng Xu, Jikang Liu

2178 Individually Dispersing Single-Walled Carbon Nanotubes in Water without Cutting

[Peng Wang, Mijin Kim, Zhiwei Peng, Chuanfu Sun, Jasper Mok, Anna Lieberman, YuHuang Wang](#)

2179[Three-Dimensional Pore-Controlled Nitrogen-Doped Graphene Hydrogels for High-Performance Supercapacitor Developed through Properly Modulating By Formamide](#)

[Yao Wang, Zidong Wei](#)

2180[Synthesis of Nitrogen-Doped Hierarchical Porous Carbons By a Phase-Transition-Assisted Method](#)

[Wei Li, Wei Ding, Zidong Wei](#)

2181[Effect of Frequency on Structure of Porous Alumina Formed By Indirect Oxidation](#)

[Mami Ishino, Hideki Hashimoto, Hidetaka Asoh](#)

2182[Effect of Electric Field Strength on Barrier Layer Thickness and Anion Incorporation of Anodic Porous Alumina](#)

[Ayaka Takao, Hideki Hashimoto, Hidetaka Asoh, Sachiko Ono](#)

2183[Metal-Assisted Chemical Etching of GaAs Using Au Nanodots](#)

[Ryota Imai, Hideki Hashimoto, Hidetaka Asoh](#)

2184[Real-Time Microelectrochemical Observation of Very Early Stage of Pitting on Carbon Steel in Chloride Solution](#)

[Mariko Kadowaki, Izumi Muto, Yu Sugawara, Takashi Doi, Kaori Kawano, Nobuyoshi Hara](#)

2185[In Situ Microscope Observation of Pitting Corrosion on Al-Mg Alloy Using Micro Electrochemical Measurement and Effects of pH on Dissolution Behavior](#)

[Hiroshi Kakinuma, Izumi Muto, Yu Sugawara, Yoshiyuki Oya, Yoshihiko Kyo, Nobuyoshi Hara](#)

[2186 Anisotropic Etching Characteristics of the Copper Electrodeposits with a Preferred Orientation on Si Substrates](#)

[Sang-Hyuck Kim, Chae-Min Park, Seongjae Mun, Hyo-Jong Lee](#)

[2187 Effect of Applied Stress on Pitting Corrosion Behavior of Type 304 Stainless Steel in Chloride Environment](#)

[Shimpei Tokuda, Izumi Muto, Yu Sugawara, Nobuyoshi Hara](#)

[2188 Phase-Field Modeling of pH-Dependent Corrosion Reactions at an Iron/Aqueous Solution Interface](#)

[Chisa Tsuyuki, Akinori Yamanaka, Yasushi Ogimoto](#)

[2189 Dependence of Crystal Structure and Electronic Structures, Dielectric and Piezoelectric Properties on Composition for  \$\(K, Na\)NbO\_3\$ -\(Bi, Na\)TiO<sub>3</sub>](#)

[Hiroki Shiikuma, Naoya Ishida, Naoto Kitamura, Yasushi Idemoto](#)

[2190 Effects of Reaction Conditions on Electroreduction of Biomass-Derived Furfural and Its Side Reactions in Acidic Electrolyte](#)

[Sungyup Jung, Alexandros N Karaiskakis, Elizabeth J Biddinger](#)

[2191 Robust Diamond Electrodes for Electrochemical Applications](#)

[Mary Enschede, Cory Allen Rusinek, Michael Becker, Robert Rechenberg, Aaron Hardy, Bettina Wehring, Thomas Schuelke](#)

[2192 Electrochemical Reactions of White Phosphorus and Ketones](#)

[Elena Gorbachuk, Elena Badeeva, Evamarie Hey-Hawkins, Dmitry Yakhvarov](#)

[2193 Electrochemical Characterization of Mixed Electrolyte of Alkaline Quinone Flow Battery](#)

[Kangsan Kim, Soowhan Kim, Seunghun Jung](#)

[2194 Electrochemical Discussion of Various Materials Modified By Friction Reforming Suitable for Marine Environment](#)

[Zhu Yao, Fujino Toshikazu, Jibiki Tatsuhiko](#)

[2195 A Simple Electrochemical Method for Preparing Gold Nanoparticles on Graphite](#)

[Yoshitaka Fukuda, Yoshiharu Mukouyama, Takashi Nishimura](#)

[2196 Electrodeposition and Anodization of Al–W Alloy Films](#)

[Shota Higashino, Masao Miyake, Takumi Ikenoue, Tetsuji Hirato](#)

[2197 Effect of Cu Addition and Annealing on Electrodeposited Bi-Te Films for Micro Thermoelectric Devices](#)

[Misaki Sugie, Daiki Furuyama, Mikiko Saito, Yoshiaki Sonobe, Hidefumi Takahashi, Ichiro Terasaki, Takayuki Homma](#)

[2198 Electrochemical Synthesis of Well-Ordered Macroporous Structures of Nickel – Ruthenium Alloys with Low Overpotential on Hydrogen Evolution Reaction](#)

[Dawid Kutyla, Karolina Kolczyk, Remigiusz Kowalik, Piotr Zabinski](#)

[2199 Spontaneous Motion of Oil Droplets on Au Electrode during Sn Electrodeposition: Factors Creating Imbalance of Interfacial Tension](#)

[Yutaka Ishibashi, Yoshitaka Fukuda, Yuri Yamada, Yoshiharu Mukouyama, Shuji Nakanishi, Shinji Yae](#)

[2200 Coalescence of Nickel Nanowires By Proton Ions Beam Irradiation](#)

[Shehla Honey, Ishaq Ahmad, Maaza Malik](#)

[2201 Contact Joining Study of Copper and Nickel Nanowires](#)

[Shehla Honey, Ishaq Ahmad](#)

[2202Reduction in Diameters of Copper Nanowires Due to Low Energy Hydrogen Ions Beam Irradiation-Induced Sputtering Phenomenon](#)

[Shehla Honey, Madhuku Morgan, Ishaq Ahmad, Malik Maaza, Shahzad Naseem](#)

[2203Accurate Modeling of Gate-Induced Drain Leakage for III-V Mosfets](#)

[Sangwook Kim, Sayeef Salahuddin](#)

[2204Fabrication of Channel Type Mixing Devices for Efficient Solvent Extraction for High Purity Silica Production](#)

[Yelchur Venkata Akash, Masaki Mimura, Masahiro Kunimoto, Yasuhiro Fukunaka, Takayuki Homma](#)

[2205Mechanical-Electrical Behaviour of Conductive Polymer / Metal Composite for Flexible Interconnect](#)

[Rei Sato, Jin Kawakita, Toyohiro Chikyow, Yukihiro Sakamoto](#)

[2206Homogeneous Catalysts for Hydrogen Generation Reactions Based on Nickel \(II\), Manganese \(II\), Cobalt \(II\), and Iron \(II\) Ions](#)

[Zachary Messegee, Julia Madeline Long, Elizabeth Robertson, Qui Quach, Rachel Whiteman, Tarek M Abdel-Fattah](#)

[2207Nickel-Tungsten Composite Anodes, in Anion Exchange Membrane Fuel Cells](#)

[Morteza Rezaei Talarposhti, Aaron Joseph Roy, Alexey Serov, Kateryna Artyushkova, Barr Zulevi, Plamen Atanassov](#)

[2208Yolk@Shell Bimetallic Nanomaterials Synthesis Creating Bifunctional Catalysts – a Proof-of-Concept Study](#)

[Felix Fink, Amandine Guiet, Anna Fischer](#)

[2209Effects of Particle Size and Substrate Charge on Alkaline Hydroelectrocatalysis](#)

Jennifer Claire Gallup, Maureen Han-Mei Tang

2210 Oxygen Reduction Reaction Activity of Pt-Ni Nanoparticles Prepared By Using Arc Plasma Deposition

Yuki Hara, Ai Araki, Masaru Kato, Ichizo Yagi

2211 Characterization of Perfluorinated Sulfonic Acid Proton Exchange Membranes with Heteropolyacid Functionalized Fluoroelastomer

Jessica Hoffman, Andrew M Herring, Andrew R Motz, Mei-Chen Kuo, Tara P Pandey

2212 The Electrochemical Activity of Nitrogen Doped Graphene Towards Oxygen Reduction Reaction in Ionic Liquid at Intermediate Temperature

Hasna Puthen Peediyakkal, Syojiro Kikuchi, Jie Yu, Hirokazu Munakata, Kiyoshi Kanamura

2213 Analysis of Cell Life and Performance of Molten Carbonate Fuel Cells with Li-Na and Li-K Carbonate Electrolytes

Ki-jeong Lee, Yu-Jeong Kim, Choong-Gon Lee

2214 Investigation of Defect and Electronic Structures of  $\text{La}_6\text{WO}_{12}$ -Based Protonic Conductors By a Combination of Total Scattering Measurement and Theoretical Calculation

Mahiro Ozeki, Naoto Kitamura, Naoya Ishida, Yasushi Idemoto

2215 Various Mesoporous Structured-Bifunctional Catalyst for Oxygen Reduction Reaction and Oxygen Evolution Reaction

Sungwon Lee, Nam-In Kim, Jun-Young Park

2216 Determining "Apparent" Diffusion of Electrons through a Nafion Membrane Using Hydrodynamic Voltammetry

Marissa Kayle Reynolds, David W Paul

[2217 Investigating Novel Anion-Conducting Polymers Via X-Ray Scattering](#)

[Eric Matthew Schibli, Andrew G. Wright, Steven Holdcroft, Barbara J Frisken](#)

[2218 Understanding the pH Dependence of the Reversible Hydrogen Reaction through Modified Low Index Pt Single Crystals](#)

[Saad Intikhab, Joshua David Snyder, Maureen Tang](#)

[2219 Self-Assembly- and Preshaping-Assisted Synthesis of Ultrathin Nitrogen-Doped Graphitic Carbon Lamellas Supported Molybdenum Carbide for Hydrogen Evolution Reaction](#)

[Lishan Peng, Ling Zhang, Jingjun Shen, Zidong Wei](#)

[2220 Controlled Synthesis of Hollow Micro/Meso-Pore Nitrogen-Doped Carbon with Tunable Wall Thickness and Specific Surface Area As Efficient Electrocatalysts for Oxygen Reduction Reaction](#)

[Rui Wu, Siguo Chen, Zidong Wei](#)

[2221 Using Redox-Induced Proton Transfer to Convert a Weak 3-H-Bond Dimer to a Strong 3-H-Bond Dimer](#)

[Hyejeong Choi, Diane K. Smith](#)

[2222 Synthetic Melanin Films As Potential Interfaces for Peroxynitrite Detection and Quantification](#)

[Haitham Kalil, Clara Kay, Ousama Al-Mahmoud, Mekki Bayachou](#)

[2223 Redox-Dependent Binding to an Electroactive Urea: Comparison of Ferrocene and Phenylenediamine Redox Couples with Two Different Guests](#)

[Kyle Logan, Diane K. Smith](#)

[2224 Evaluating the Roles of Proton Transfer and H-Bonding in the Electron Transfer Reactions of Organic Redox Couples in Non-Aqueous Solvents: Oxidation of Phenylenediamines in the Presence of Added Bases in Acetonitrile](#)



[Tammy Dung Pham, Diane K. Smith](#)

[2225 Evaluation of Morphology-Related Factors That Influence the Product Selectivity on Polycrystalline Cu](#)

[Alexandros N Karaiskakis, Elizabeth J Biddinger](#)

[2226 Nickel Nanocluster Loaded Black Titania for Photocatalytic Reduction of CO<sub>2</sub> into Solar Fuels: Computational and Experimental Studies](#)

[Tadesse Billo Reta, Fang-Yu Fu, Putikam Raghunath, Indrajit Shown, Wei-Fu Chen, Tzu-Hsien Shen, M.C. Lin, Chih-Hao Lee, Jih-Shang Hwang, Li-Chyong Chen, Kuei-Hsien Chen](#)

[2227 Relationship Between ORR Catalytic Activity and D-Band Center of Pt Nanoparticle Deposited on Metal Oxide Support Materials](#)

[Fuma Ando, Toyokazu Tanabe, Takao Gunji, Takashi Tsuda, Shingo Kaneko, Tsuyoshi Takeda, Takeo Ohsaka, Futoshi Matsumoto](#)

[2228 Properties of Concentrated Aqueous Electrolyte Solution in a Vicinal Region of Coexisting Solid Surface](#)

[Nobuaki Kunikata, Masaki Matsui, Hideshi Maki, Minoru Mizuhata](#)

[2229 N-Shaped Negative Differential Resistance in the Oxidation of Methanol on Platinum in the Absence of Water](#)

[Shinichi Yamaguchi, Terumasa Kuge, Mitsunobu Kikuchi, Yoshiharu Mukoyama, Shuji Nakanishi](#)

[2230 Methanol Production – a Key Intermediate in the Electrochemical Interconversion of Organics to Chemicals and Fuels](#)

[Travis J Omasta, Xiong Peng, William E Mustain](#)

[2231 Biomass-Derived Porous Carbon As Noble-Metal Free Catalysts for Oxygen Reduction Reaction](#)

[Casey Culhane, Xiaojun Liu, Shouzhong Zou](#)

2232 [Development of a Portable Nickel-Based Sensor for Hydroxyl Ion](#)

[Behnaz Jafari, Madhivanan Muthuvel, Gerardine G Botte](#)

2233 [Effects of Oxide Composition of Amorphous RuO<sub>2</sub>-Ta<sub>2</sub>O<sub>5</sub> Catalyst on Electrochemical Sensing to Hydrogen Carbonate Ion](#)

[Chinami Iketani, Ai Honda, Masatsugu Morimitsu](#)

2234 [On-Chip Detection of Hydrogen Peroxide with Bimetallic Nanoparticles in Electrochemical Microfluidic Sensor](#)

[Euna Ko, Van-Khue Tran, Yangfang Geng, Min Ki Kim, Ga Hyun Jin, Gi Hun Seong](#)

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2235 [Optical Cooling of CdSe/ZnS Quantum Dots Embedded in PMMA](#)

[Ross Fontenot, Veerendra Mathur, John Barkyoumb](#)

2236 [Oxidation State Measurements of Cerium Dioxide Nanoparticles: Selecting Measurement Parameters and in Situ Observations](#)

[Aaron Johnston-Peck](#)

2237 [Flexible and Versatile Nanoparticle Synthesis By Gas-Diffusion Electrocrystallization](#)

[Xochitl Dominguez-Benetton, Rafael Prato-Modestino, Sam Eggermont, Guillermo Pozo, Jan Fransaer](#)

2238 [Analysis of Amorphous Matrices Induced in Nickel Nanowires Due to Kilo-Electron-Volt H<sup>+</sup> Ions Beam Irradiation for Application in Spacecrafts](#)

[Shehla Honey, Ishaq Ahmad, Maaza Malik, Kennedy John, Shahzad Naseem](#)

[2239Field-Driven Splitting of Pure Water Based on Deep-Sub-Debye-Length Nanogap Cells](#)

[Yifei Wang, S. R. Narayanan, Wei Wu](#)

[2240Funtionalization and Electrocatalytic Application of Electrolessly Deposited Silver Nanoplatelet Films](#)

[Falk Münch, Christina Roth, Alexander Vaskevich, Israel Rubinstein](#)

[2241A Single-Crystal Electrochemical Study of the Facet-Selective Chemistry That Drives Anisotropic Growth of Cu Nanowires](#)

[Myung Jun Kim, Patrick F. Flowers, Ian E. Stewart, Shengrong Ye, Seungyeon Baek, Jae Jeong Kim, Benjamin J. Wiley](#)

[2242Electrochromic Characteristics of Nano-Sized Cluster Nickel-Oxide Thin Film](#)

[Ke-Hsuan Wang, Takeshi Kawai](#)

[2243Macroscale Films of Highly Ordered Periodic 3D Semiconductor Nanostructures Generated Via Lithography-Free Photoelectrodeposition](#)

[Azhar I Carim, Nicolas A. Batara, Anjali Premkumar, Harry A Atwater, Nathan S Lewis](#)

[2244Influence of TCNQ Loading on the Mechanical Properties of Metal-Organic Framework Films](#)

[Yousuf Mohammed, Xin Chen, Zeinab Mohamed Hassan, Helmut Baumgart, Engelbert Redel](#)

[2245Fabrication of Superhydrophobic Aluminum Surfaces By Pyrophosphoric Acid Anodizing and SAM Modification](#)

[Daiki Nakajima, Tatsuya Kikuchi, Shungo Natsui, Ryosuke O. Suzuki](#)

[2246The Effect of CVD-Graphene at the Active-Layer/Current-Collector Interface for High-Performance Supercapacitor](#)

[Younghwi Kwon, Junsung Shin, Yongho Seo](#)

[2247Local Structure of Highly Conductive Vanadate Glass Containing Tin oxide Studied By RT-Mössbauer Spectrum](#)

[Nobuto Oka, Yuki Fujita, Tomoka Izumi, Shiro Kubuki, Tetsuaki Nishida](#)

[2248Electrochromic WO<sub>3</sub> Films with Controlled High-Rate Deposition By Hollow Cathode Gas Flow Sputtering](#)

[Nobuto Oka, Masahiro Watanabe, Junjun Jia, Kaoru Sugie, Yoshinori Iwabuchi, Hidefumi Kotsubo, Yuzo Shigesato](#)

[2249Study about an Experimental Design for CdTe Quantum Dots Synthesis. Analysis of the Optical Changes after Their Interaction with Hydroxyl Radicals](#)

[Eduardo Carlo Muñoz, Emilio Alonso Navarrete, Víctor Rojas, Javier Román, Rodrigo Gonzalo Henríquez, Ricardo Silvio Schrebler](#)

[2250Study about Electrostatic Deposition of CdTe Quantum Dots on Glassy Carbon Electrodes](#)

[Eduardo Carlo Muñoz, Víctor Rojas, Emilio Alonso Navarrete, Javier Román, Rodrigo Gonzalo Henríquez, Ricardo Silvio Schrebler, Mario Romero](#)

[2251Gold Aerogel As a Novel Catalyst for Hydrogen Generation Reaction from a Hydrogen Feedstock Material](#)

[Justin Osborn, Mitchell Horten, Tarek M Abdel-Fattah](#)

[2252Hydrogen Generation Reaction of Sodium Borohydride Catalyzed By Gold and Platinum Nanoparticles](#)

[Julia Madeline Long, Austin Heyman, Clay Huff, Tarek M Abdel-Fattah](#)

[2253Synthesis and Application of Nickel Terephthalate MOF for Hydrogen Generation](#)

[Zachary Messegee, Justin Osborn, Tarek M Abdel-Fattah](#)

[2254 Study about Overall Adhesion-Spreading Process of Liposomes on a Gold Electrode. Influence of the Presence of CdTe Quantum Dots](#)

[Eduardo Carlo Muñoz, Javier Román, Emilio Alonso Navarrete, Víctor Rojas](#)

[2255 Synthesis and Characterization of Gold Nanoparticle/Boron Nitride Nanotube Composites Toward Hydrogen Generation Reaction](#)

[Clay Huff, Thomas Dushatinski, Tarek M Abdel-Fattah](#)

[2256 Aqueous Phase Synthesis of Cu-in-Ga Photovoltaic Nanoparticles for the CIGS Printable Solar Cell Application](#)

[Hideyuki Takahashi, Shun Yokoyama, Kazuyuki Tohji](#)

[2257 The Influence of Various Fluencies of Copper Ions \(Cu<sup>+</sup>\) on Optical and Electrical Properties of Silver Nanowires \(Ag-NWs\) Thin Films for Photovoltaic Applications](#)

[Shehla Honey, Ishaq Ahmad, Shakeel Khan, Naveed Z., Shahzad Naseem, Malik Maaza](#)

### **Z03-Energy-Water Nexus**

[2258 \(Invited\) 2D Transition Metal Carbides \(MXenes\) in Flow-Assisted Electrochemical Energy and Water Technologies](#)

[Bilen Akuzum, Lutfi Agartan, E. Caglan Kumbur, Yury Gogotsi](#)

[2259 Capacitive Deionization Performance of Thermally Surface Modified Activated Carbon Cloth Electrodes](#)

[Lutfi Agartan, Bilen Akuzum, Tyler Mathis, Kurtay Ergenekon, Ertan Agar, Yury Gogotsi, E. Caglan Kumbur](#)

[2260 High Electrical Power Densities from Salinity Gradients By Combining Electrode and Donnan Potentials in a Single Electrochemical Cell](#)

[Christopher A Gorski, Taeyoung Kim, Bruce E. Logan](#)

[2261 Energy from Salinity Gradients](#)

[Subramaniam Chittur Krishnaswamy](#)

2262 [Evaluation of Non-Adiabatic Thermodynamic Cycles for Electroadsorption Based Deionization](#)

[Jiankai Zhang, Mohammadreza Nazemi, Marta C. Hatzell](#)

2263 [\(Invited\) Advanced Wood Nanostructures Toward Energy-Water Nexus](#)

[Liangbing Hu](#)

2264 [Sustainable Autarky of Food-Energy-Water \(SAFE-Water\)](#)

[V. Chaitanya, S Gedara, M Karbakhshi, N Khandan](#)

2265 [Photoelectrochemical Zero Liquid Discharge System for Concentrate Brine Management](#)

[Syed Mubeen](#)

2266 [\(Invited\) What would Thomas Malthus tell us in the 21st Century?: Experiences in the Water-Energy-Food Nexus from an International Development Perspective](#)

[Fernando Miralles-Wilhelm](#)

2267 [\(Invited\) Innovations at the Nexus of Food, Energy, and Water Systems \(INFEWS\) and Beyond](#)

[James W. Jones](#)

2268 [\(Invited\) Overview of NSF-EPRI Collaboratively Funded Advanced Dry Cooling Program](#)

[Jessica Shi](#)

2269 [\(Invited\) DOE's Approach to the Energy Water Nexus: New Opportunities and Solutions](#)

[Robert Ivester](#)

2270 [\(Invited\) Technology's Role in Sustainable Energy](#)

[Ellen D. Williams](#)

2271 [\(Invited\) Membrane Science and Technology for Water-Energy-Food Nexus Applications](#)

[Benny D. Freeman](#)

2272 [New Anion Exchange Membranes Tailored to Address Problems in Energy Conversion and Water Purification](#)

[Andrew M Herring, Tara P Pandey, Himanshu N Sarode, Ye Liu, Mei-Chen Kuo](#)

2273 [Rationale Design of Ion-Exchange Membranes for Low Energy Brackish Water Desalination Via Membrane Capacitive Deionization](#)

[Christopher George Arges, Varada Menon Palakkal](#)

2274 [SOFC Co-Generation of Electricity and Clean Water](#)

[Eric D. Wachsman, Thomas H Hays](#)

2275 [Food Waste to Feed-Stock Chemicals, Using Microbial Consortia and Bio-Hybrid Fuel Cells](#)

[David Mark Mackie, Justin P. Jahnke, Marcus S. Benyamin, Hannah M. LeFors, Christian J. Sund](#)

2276 [Treatment of Acid Mine Drainage from an Abandoned Coal Mine in a Microbial Fuel Cell](#)

[Jia Liu](#)

2277 [Ammonia Electrolysis in a Municipal Wastewater Treatment Plant](#)

[Gerardine G Botte](#)

2278 [Design of Iron-Based Nanomaterials As Catalysts for Efficient Water Treatment and Electrochemical Energy Conversion](#)

[Mojtaba Abolhassani, Prashant Acharya, Shelby L Foster, David Suttmiller, Sergio I. P. Bakovic, Lauren F Greenlee](#)

2279 [Conversion of Saline Water and Carbon Dioxide into Value-Added Chemicals By Electrodialysis](#)

[Arman Bonakdarpour, Saad Dara, Meghan Ho, Alfred Lam, David P Wilkinson](#)

2280 [Organic Molecular Catalyst for Electrochemical Production of Hydrogen Peroxide](#)

[Xi Yin, Ling Lin, Ulises Martinez, Hoon T Chung, Piotr Zelenay](#)

2281 [Evaluating the Potential for Hydrogen Production with Donnan-Driven Multi-Ion Exchange Membrane Based Systems](#)

[Mohammadreza Nazemi, Avery Agles, Kelsey Dobson, Marta C. Hatzell](#)

2282 [Sustainable, Inexpensive Synthesis of High Purity Graphite from Biomass with Excellent Performance in Li-Ion Battery Anodes](#)

[Nathan A Banek, Dustin T Abele, Kevin R. McKenzie, Michael J Wagner](#)

2283 [Electrochemical Ferrates for Drinking Water Treatment: Quantification, Synthesis and Degradation Studies](#)

[Macarena Cataldo, Arman Bonakdarpour, Greg Afonso, Madjid Mohseni, David P Wilkinson](#)

2284 [Three Dimensional Electrodes for Seawater Desalination](#)

[Sattar Alsaedi](#)



[2285 Amorphous Iron-Nickel \(oxo\)Hydroxide Nano-Particles Immobilized on SnO<sub>2</sub> Nanotube Arrays As an Integrate Anode for Oxygen-Evolution Reaction](#)

[Rui Xiang, Zidong Wei](#)

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[2286\(Invited\) Brain Initiative & Biomaterials Research Support at the National Science Foundation](#)

[Aleksandr Simonian](#)

[2287\(Invited\) The NIH BRAIN Initiative – the Road Thus Far and into the Future](#)

[Nick Brandon Langhals](#)

[2288\(Invited\) The Biotic/Abiotic Interface between Neuromodulation Electrodes and the Peripheral Nervous System](#)

[Michael B. Wolfson](#)

[2289\(Invited\) A FDA Staff Perspective on Navigating the Regulatory Landscape and Moving Medical Devices to the Marketplace](#)

[Kelliann Wachrathit](#)

[2290\(Invited\) Reanimating Paralyzed Limbs and the Future of Bioelectronic Medicine](#)

[Chad Bouton](#)

[2291\(Invited\) Invasive Cortical Microelectrode Array Longitudinal Performance: Temporal Dynamics of Electrical Impedance Spectroscopy and Multiunit Activity](#)

[Cristin Welle, Matthew Grant Street, Kiersten Ruda, Eugene Civillico, Pavel A Takmakov](#)

[2292\(Invited\) From Flexible Fibers to Nanomagnetism: Minimally Invasive Sensors and Actuators of Neural Activity](#)

[Polina Anikeeva](#)

2293([Invited](#)) [Neuroengineering Overview](#)

[Or A Shemesh, Edward S Boyden](#)

2294([Invited](#)) [Neural Stimulation and Recording Electrodes](#)

[Stuart F. Cogan](#)

2295([Invited](#)) [Quantification and Manipulation of the Microelectrode-Tissue Interface for Neural Prostheses](#)

[Kevin John Otto](#)

2296([Invited](#)) [Multimodal Microelectrode Failure Analysis Reveals Complex Relationship at the Neural Interface](#)

[Takashi D.Y. Kozai](#)

2297([Invited](#)) [Using Electrochemical Measurements to Diagnose Neural Interface Electrodes](#)

[Philip Troyk, Glenn DeMichele](#)

2298([Invited](#)) [Next Generation Strategy for Reproducible, Compliant Microelectrode Arrays](#)

[Joseph J. Pancrazio, Walter E Voit, Jeffrey R Capadona](#)

2299([Invited](#)) [Electrochemical Deposition of Conjugated Polymers in the Brain](#)

[David Charles Martin, Liangqi Ouyang, Vivek Subramanian](#)

2300([Invited](#)) [Stability of PEDOT:PSS Coating Under Electrical Stimulation – a Bench Study](#)

[Alan Shi, Jennifer Braunschweig, Erik Scott, Tim Denison, Jinbo Hu](#)

[2301\(Invited\) Development of Flexible Conductive Polymer Electrodes for Recording and Stimulation of Neural Tissue](#)

[Daniel Merrill, Alexander Thiessen, Christopher Smith, Daniel McDonnall](#)

[2302\(Invited\) Exploring Brain Chemistry with Microelectrodes](#)

[Robert Mark Wightman](#)

[2303\(Invited\) Real-Time Striatal Measurements of Oxidative Stress and Dopamine in the Dyskinetic Rat during Chronic L-DOPA Treatment for Parkinson's Disease](#)

[Leslie A Sombers, Leslie R. Wilson, Catherine F. Mason, Christie A Lee](#)

[2304\(Invited\) Dopamine, Acetylcholine, and Insulin: Modulators of Motivation](#)

[Margaret E Rice](#)

[2305\(Invited\) In Vivo Electroanalytical Measurements of Norepinephrine in the Brain: Current Status and Remaining Challenges](#)

[Jinwoo Park, Rohan Bhimani, Ken Wakabayashi, Caroline Bass](#)

[2306\(Invited\) Fast Scan Cyclic Voltammetry for Probing Depression and Developmental Disorders](#)

[Parastoo Hashemi](#)

[2307\(Invited\) Exploring the Therapeutic Potential of the Endocannabinoid System in Huntington's Disease](#)

[Joseph F Cheer](#)

[2308\(Invited\) New Platforms for Multiplexing Electrochemical Measurements In Vivo](#)

[Michael Leandro Heien](#)

[2309\(Invited\) Multimodal Microprobe for Combined Multiple Neurochemical Sensing and Optical Stimulation](#)

[Kate M Wassum, Pei-Yu Chiou, Nigel T Maidment, Harold G Monbouquette](#)

[2310\(Invited\) New Methods to Fabricate Electrodes for Neurotransmitter Measurements](#)

[B. Jill Venton, Cheng Yang](#)

[2311\(Invited\) Carbon Fiber Electrode Array for the Detection of Electrophysiological and Dopaminergic Activity](#)

[Paras R. Patel, Pavlo Popov, Ali Mohebi, Arif Hamid, Jeffrey Pettibone, Doug Roossien, Brandon Aragona, Dawen Cai, Joshua Berke, Cynthia Chestek](#)

[2312\(Invited\) A Hybrid CMOS-Graphene Integrated Sensing Platform for Subsecond Dopamine Detection](#)

[Ting WU, Bayan Nasri, Abdullal Alharbi, Roozbeh Kiani, Davood Shahrjerdi](#)

[2313\(Invited\) Carbon Nanotube-Based Microelectrodes for Enhanced Neurochemical Detection](#)

[Alexander George Zestos, B. Jill Venton](#)

[2314\(Invited\) Electrolytic Hydrogen Clearance for Measuring Cerebral Blood Flow](#)

[Gregory S McCarty, Christie A Lee, Lindsay Walton, Leslie A Sombers, Robert Mark Wightman](#)

[2315\(Invited\) Nanogap Voltammetry of Clean Surface of Electron-Beam-Deposited Carbon](#)

[Shigeru Amemiya, Ran Chen, Amin Najarian, Ryan Balla, Richard Louis McCreery](#)

[2316\(Invited\) Electrochemical Characteristics of Diamond Films for Neural Devices](#)

[H. Martin](#)

[2317\(Invited\) Carbon Nanoelectrodes for Dopamine Detection and Intracellular Electroanalysis](#)

[Michael V. Mirkin, Keke Hu, Dengchao Wang](#)

[2318\(Invited\) Chemistry of Robust Neural Interfaces](#)

[Pavel A Takmakov](#)

[2319Boron-Doped Diamond Sensors for Neurotransmitter Detection: Fabrication and Characterization](#)

[Michael Becker, Cory Allen Rusinek, Bin Fan, Wen Li, Yue Guo, Robert Rechenberg](#)

[2320Automated and High-Throughput Reactive Accelerated Aging System to Evaluate Performance of Neural Implants](#)

[Matthew Grant Street, Ryan Caldwell, David J. Warren, Loren Rieth, Pavel A Takmakov](#)

[2321\(Invited\) History of a Passion and of a Long Courtship: From the Brain to the “Artificial Synapse”](#)

[Christian Andre Amatore](#)

[2322\(Invited\) Enabling Bioelectrochemistry for In Vivo Analysis](#)

[Lanqun Mao](#)

[2323\(Invited\) Stretchable Electrochemical Sensor for Inducing and Monitoring Cell Mechanotransduction in Real-Time](#)

[Wei-Hua Huang](#)

[2324\(Invited\) Amperometry Detection of Full Fusion Mode of Catecholamine Exocytosis from Single PC12 Cell Elicited By Sodium Dodecyl Sulfate](#)

[Ren Hu, Alexander Oleinick, Irina Svir, Bin Ren, Chang-Jian Lin, Dong-Ping Zhan, Christian Andre Amatore, Zhong-Qun Tian](#)

[2325\(Invited\) Detection of D-Serine Using an Enzymatic Amperometric Biosensor and Its Localized Detection Using Scanning Electrochemical Microscopy](#)

[David Polcari, Samuel C Perry, Loredano Pollegioni, Matthias Geissler, Janine Mauzeroll](#)

[2326\(Invited\) Vesicular Exocytosis in Neuronal and Neuroendocrine Cells: Quantifying Fusion Pore Size from Amperometric Data](#)

[Alexander Oleinick, Irina Svir, Christian Andre Amatore](#)

[2327\(Invited\) Modulating and Recording from Peripheral Nerves and End-Organs Using Electricity and Ultrasound](#)

[Hubert Lim](#)

[2328\(Invited\) Light up the Brain with Genetically Encoded Indicators of Neural Activity](#)

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[2329\(Invited\) Conjoint Measurement of Brain Electrophysiology and Neurochemistry](#)

[Hitten P. Zaveri, Nimisha Ganesh, Irina I Goncharova, Eyiymisi Damisah, Caroline Ong, Edgar Perez, Lawrence Staib, Lawrence Hirsch, Ognen Petroff, Dennis Spencer, Tore Eid](#)

[2330\(Invited\) Novel Carbon-Based Sensors for the Next Generation of Neurochemical Measurements](#)

[Leslie A Sombers, Gregory S McCarty, James G Roberts, Lars E Dunaway, Sarah E Calhoun, Carl J Meunier, Edwin C Mitchell](#)

[2331\(Invited\) Effect of Surface Area to Perimeter Ratio on Charge Storage Capacity of Microelectrodes for Neurostimulation](#)

[Hyunsu Park, Pavel A Takmakov, Hyowon Lee](#)

[2332\(Invited\) Long-Term Stimulation Stability of IrO<sub>x</sub> Tip Metallization for the Utah Electrode Array](#)

[Brian Baker, Ryan Caldwell, Rohit Sharma, Davis Crosland, Loren Rieth](#)

[2333\(Invited\) Scaling Effects on the Electrophysiological Stimulation Capabilities of PEDOT:PSS, Pt, and Au](#)

[Mehran Ganji, Shadi Dayeh](#)

[2334\(Invited\) Long-Term Viability of Optogenetically Transfected Neurons and Implantable Electrodes in the Motor Cortex of Mice](#)

[Christopher Gorini, Beomseo Koo, Cara Altimus, Eugene Civillico](#)

[2335\(Invited\) In Vivo Electrochemical Monitoring of Free Endogenous Hydrogen Sulfide](#)

[Meining Zhang](#)

[2336\(Invited\) Polyelectrolyte-Modified Micropipette As a New Platform for In Vivo Analysis](#)

[Ping Yu](#)

[2337\(Invited\) Cultivation of Rat Nerve Cells on Biodegradable Sheet Made of Poly \(lactic-co-glycolic acid\) Thin Film with Micropatterns of Polylysine Containing Laminin Layer](#)

[Yuki Nakamura, Shunpu Horiuchi, Eiki Koshinuma, Satomitsu Imai, Yasuhiro Nishioka](#)

[2338\(Invited\) Plasma Membrane Cholesterol as a Diagnostic](#)

[Li Li, Binyu Lu, Minchul Shin, Thomas Kelley, James D. Burgess](#)

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[2339Detection of Foodborne Bacteria based on AlGa<sub>N</sub>/Ga<sub>N</sub> HEMT DNA Sensors](#)

Minseo Park, Resham Thapa, Ahjeong Son

2340A Novel Soft Sensor Approach for Estimating Individual Biomass in Mixed Cultures with Applications to Agricultural Waste and Wastewater Treatment

Nathan Roberts, Bryan A Chin, Q. Peter He, Jin Wang

2341 Nanostructured Microcantilevers for the Sensing of Volatile Organic Compounds for Environmental and Food Safety Applications

Ryan J. McNeilly, Peter Hesketh, Oliver Brand, Karolyn M. Hansen

2342 Clay Coating Systems for Removal of Heavy Metals for Waste Water

David Blersch, Majid Beidaghi, Edward Davis

2343 Development and Optimization of Capacitive Deionization for Treatment of High-Strength Agricultural Waters

Jafar Orangi, David Blersch, Edward Davis, Pengyu Chen, Majid Beidaghi

2344 Real-Time Bacterial Detection in Liquid By Using Magnetoelastic Biosensors and a Surface-Scanning Coil Detector

Songtao Du, Yuzhe Liu, Shin Horikawa, I-Hsuan Chen, Yating Chai, Howard Clyde Wikle, Sang-Jin Suh, Bryan A Chin

2345 Design, Simulation and Fabrication of a Novel Phage Filter for Pathogens Testing from Large Volumes of Water

Xu Lu, Songtao Du, Shin Horikawa, Yuzhe Liu, I-Hsuan Chen, Howard Clyde Wikle, Jianguo Xi, Sang-Jin Suh, Bryan Allen Chin

2346 Field-Deployable Wireless Sensor Networks for Mapping Inorganic N-Containing Species in Soil

Wen Yang, Jiacheng He, Thorsten Knappenberger, Majid Beidaghi, Denis Nadolnyak, Zhongyang Cheng, Bryan Allen Chin, Pengyu Chen



[2347Direct Conversion Fuel Cell of Urine in Animal Wastes and Its Condition Monitoring Sensors for Efficient Water Usage in Agriculture](#)

[Eunji Lee, Jaesik Yoon, Doohee Lee, Sungpil Woo, Youngsoo Yoon, Yi Wang, Bart Charles Prorok, Dong-Joo Kim](#)

[2348Dendrimer-Encapsulated Ultra-Small Porous MnO<sub>2</sub>-Fe<sub>3</sub>O<sub>4</sub> Nanosphere for Clean Water](#)

[Yan Zhu, Wen Yang, Yuxin Cai, Thorsten Knappenberger, Majid Beidaghi, Zhongyang Cheng, Bryan Allen Chin, Pengyu Chen](#)

[2349Fabrication of Magnetostrictive Nano-Tubes/Bar As Sensor Platform](#)

[ZhiZhi Zheng, Z.-Y. Cheng, Kewei Zhang](#)

[2350Rapid Pathogendetection By Surface Swab Sampling and Wireless Biosensing](#)

[Yuzhe Liu, Songtao Du, Shin Horikawa, I-Hsuan Chen, Howard Clyde Wikle, Xu Lu, Sang-Jin Suh, Edward Davis, Steven Mansoorabadi, Dong-Joo Kim, Denis Nadolnyak, Bryan Allen Chin](#)

[2351Detection of Bacillus Anthracis Spores in Water Using a Phage-Coated Piezoelectric Membrane](#)

[Xu Lu, Liang Wang, Lei Hou, Zhongyang Cheng](#)

[2352Development of Semiconductor-Based Biosensor for Detection of Buckwheat Allergenic Protein in Food Products](#)

[Sho Hideshima, Mai Saito, Yoshitaka Harada, Mika Tsuna, Shigeki Kuroiwa, Takuya Nakanishi, Tetsuya Osaka](#)

[2353Label-Free and Highly Sensitive Detection of Buckwheat 16kD Allergenic Protein with Field Effect Transistor \(FET\) Sensor and Immunochromatography Strip](#)

[Yoshitaka Harada, Mika Tsuna, Sho Hideshima, Mai Saito, Shigeki Kuroiwa, Takuya Nakanishi, Tetsuya Osaka](#)

2354 [Rapid Detection of Bacterial Pathogens on 2D Food](#)

[Jianguo Xi, Shin Horikawa, I-Hsuan Chen, Yuzhe Liu, Songtao Du, Xu Lu, Howard Clyde Wikle, Sang-Jin Suh, Bryan A Chin](#)

2355 [Detection of Salmonella Enterica with Magnetoelastic Biosensors in Wash Water Containing Clorox and Chlorine Dioxide](#)

[I-Hsuan Chen, Songtao Du, Yuzhe Liu, Jianguo Xi, Xu Lu, Shin Horikawa, Howard Clyde Wikle, Sang-Jin Suh, Bryan Allen Chin](#)

2356 [Hexagonally Arranged Ag-Hemisphere Arrays with Rough Surface and the SERS Detection to Persistent Organic Pollutants](#)

[Haibin Tang, Guowen Meng, Nianqiang Wu](#)

2357 [Detection of Nitrite Pollutant with an Optical Sensor](#)

[Peng Zheng, Nianqiang Wu](#)

2358 [Detection and Subtyping of Salmonella from Raw Chicken through Targeted Salmonella Capture, Genome Amplification and Whole Genome Sequencing](#)

[Ji-Yeon Hyeon, Shaoting Li, Bryan A Chin, Xiangyu Deng](#)

2359 [Simultaneous Detection of Tumor-Specific Circulating DNA Mutation and Methylation](#)

[Lang Zhou, Bryan A Chin, Alex Simonian](#)

2360 [Low Noise, High Performance Physical Sensor for Detection of Ammonia Gas](#)

[Ardalan Lotfi, Alireza MahdaviFar, Joseph R Stetter, Daniel Struk, Milad Navaei, Peter Hesketh](#)

2361 [Artificial Cilia for Capture and Sampling](#)

Srinivas Hanasoge, Peter Hesketh, Alexander Alexeev, Matt Ballard, Marilyn Erickson, Jie Xu

2362Nondestructive Detection of Woody Chicken Breast

Ardalan Lotfi, Milad Navaei, Peter Hesketh

2363Exploration of ISE Sensor Embedded in Garden Weed Block Fabric for Continuous Soil Nitrate Sensing

Lamar Kendrell Burton, Pandiaraj Manickam, Shekhar Bhansali

2364Novel Low Symmetric Alkyne Terminated Metallophthalocyanine Modified Electrode Via Click Chemistry for Electrochemical Determination of Mercury (II)

Gertrude Fomo

2365Effects of Surface-Scanning Detector Position on the Response of a Wireless Magnetoelastic Biosensor

Shin Horikawa, Songtao Du, Yuzhe Liu, Xu Lu, I-Hsuan Chen, Howard Clyde Wikle, Pengyu Chen, Majid Beidaghi, Sang-Jin Suh, Yucheng Feng, Zhongyang Cheng, Bryan Allen Chin

2366(Invited) An Expanding Role for Sensor Research in Agriculture, Natural Resources, and Food Systems

Thomas A Bewick, Steven J Thomson

2367(Invited) The INFEWS Program at the National Science Foundation

Thomas Torgersen

2368(Invited) Sensors in Agriculture: Opportunities for Small Businesses

Rachel Melnick

[2369\(Invited\) Spectral Imaging and Instrumentation for Food Safety Evaluation of Agricultural Products](#)

[Moon Sung Kim](#)

[2370\(Invited\) Sensors in Agriculture, Food and Research; a Biological Perspective for Engineering Food Protection](#)

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[2371\(Invited\) New and Innovative Sensor Technologies for Aquacultural System in China](#)

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