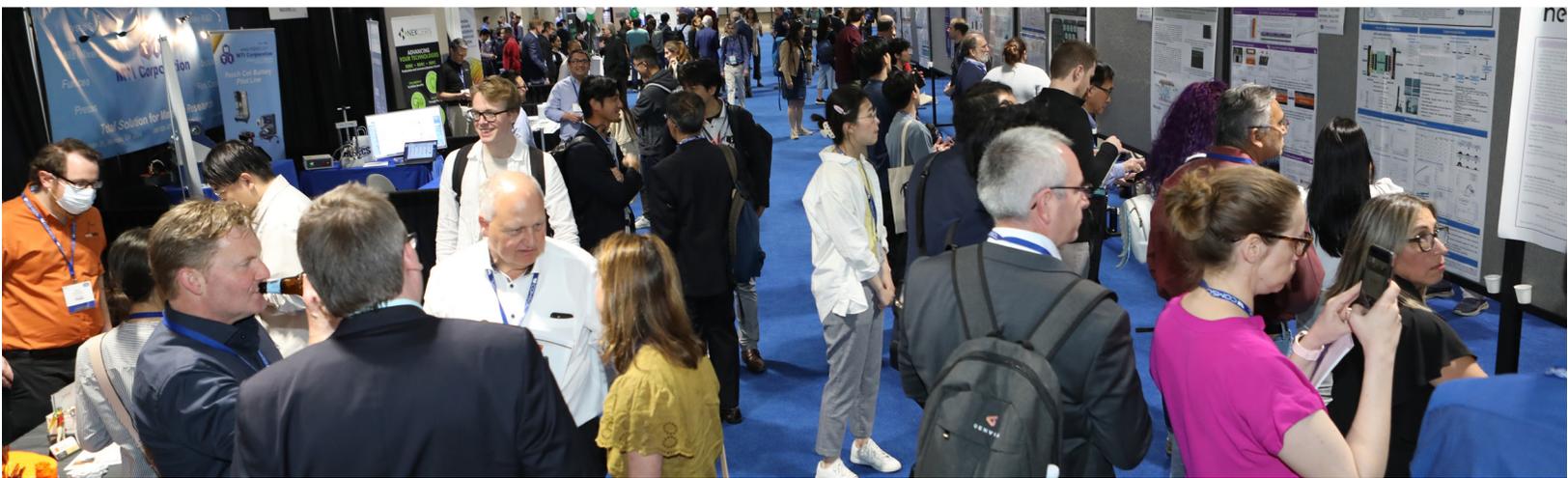




PACIFIC RIM MEETING
ON ELECTROCHEMICAL
AND SOLID STATE SCIENCE

CALL FOR PAPERS



PRiME 2024

THE JOINT INTERNATIONAL MEETING OF:
2024 Fall Meeting of The Electrochemical Society of Japan (ECSJ)
2024 Fall Meeting of The Korean Electrochemical Society (KECS)
246th Meeting of The Electrochemical Society (ECS)

HONOLULU, HI
October 6-11, 2024

Hawaii Convention Center & Hilton Hawaiian Village

with the technical co-sponsorship of:

Japan Society of Applied Physics (JSAP)
Semiconductor Physics Division, Korean Physical Society (KPS)
Society of Polymer Science, Japan (SPSJ)
Korea Photovoltaic Society (KPVS)
Korean Institute of Chemical Engineers (KIChE)

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Royal Australian Chemical Institute (EDRACI)
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The Chinese Physical Society (CPS)
Hydrogen Energy Systems Society of Japan (HESS)

www.electrochem.org/prime2024



GENERAL INFORMATION

The PRiME 2024 Meeting takes place in Honolulu, HI, from October 6-11, 2024, at the Hawaii Convention Center and Hawaiian Village. This international conference brings together scientists, engineers, and researchers

from academia, industry, and government laboratories to share results and discuss issues on related topics through a variety of formats including oral presentations, poster sessions, panel discussions, tutorial sessions, Short Courses, professional development workshops, and exhibits. The unique blend of electrochemical and solid state science and technology at a PRiME meeting provides an opportunity and forum to learn and exchange information on the latest scientific and technical developments in a variety of interdisciplinary areas.

ABSTRACT SUBMISSION

To give an oral or poster presentation at PRiME 2024, submit an **original** abstract for consideration via the **PRiME website no later than April 12, 2024**. Faxed, emailed, and late abstracts are not accepted. Meeting abstracts should explicitly state the work's objectives, new results, and conclusions or significance. After the submission deadline, symposium organizers evaluate all abstracts for content and relevance to the symposium topic, and schedule accepted submissions as either oral or poster presentations.

Letters of Acceptance/Invitation are sent via email in June 2024, notifying corresponding authors of accepted abstracts, and the date, time, and location of their presentations.

How and when a poster or oral presentation is scheduled is at the symposium organizers' discretion, regardless of presenters' requests.

PAPER PRESENTATION

Oral presentations must be in English. LCD projectors and laptops are provided for all oral presentations. **Presenting authors MUST bring their presentations on USB flash drives to use with dedicated laptops located in each technical session room.** Speakers requiring additional equipment must make written request to meetings@electrochem.org at least one month prior to the meeting so appropriate arrangements can be made, subject to availability and at the author's expense.

Poster presentations must be displayed in English. Posters should be printed in A0 format (84.1cm x 118.9cm or 33.1in x 46.8in) and labeled with the abstract number and day of presentation in the final program.

Participants in the Z01—General Student Poster Competition **are required to (1) Upload a digital poster file in advance of the meeting and (2) Be present during the in-person judging session on Tuesday evening.** The deadline to upload a digital file for the competition is sent to presenting authors. The prize categories are 1st Place (\$1,500 award), 2nd Place (\$1,000 award), and 3rd Place (\$500 award).

Digital presenters are required to submit a video of their presentation and/or a copy of the slide deck or poster that is only available for on-demand viewing via the online program through November 2, 2024. Digital presentations are NOT streamed into or out of the onsite session rooms. A digital presentation is not a substitute for an in-person oral talk if you unexpectedly cannot attend the meeting.

MEETING PUBLICATIONS

ECS Meeting Abstracts – All meeting abstracts are published in the *ECS Digital Library*, copyrighted by ECS, and become ECS's property upon presentation.

ECS Journals – Authors presenting papers at ECS meetings are encouraged to submit to the Society's technical journals: *Journal of The Electrochemical Society*, *ECS Journal of Solid State Science and Technology*, *ECS Advances* or *ECS Sensors Plus*. Although there is no hard deadline for submitting these papers, six months from the symposium date is considered sufficient time to revise a paper to meet stricter journal criteria. Author instructions are on the *ECS website*.

ECS Transactions – Select symposia publish their proceedings in *ECS Transactions* (ECST). Please check the individual symposium's call for papers in this document. Authors presenting in these symposia are welcome to submit full-text manuscripts to ECST based on their presentations. Issues of ECST are available for sale on a pre-order basis, as well as through the *ECS Digital Library* and *ECS Online Store*. Review each individual symposium's listing in this Call for Papers to determine if your symposium is publishing an ECST issue. Visit the *ECST website* for additional information including overall guidelines, author and editor instructions, a downloadable manuscript template, and more.

SHORT COURSES

Short Courses provide students and seasoned professionals with in-depth education on a wide range of topics. Novices and experts advance their technical expertise and knowledge through personalized instruction by academic and industry experts. Short Courses require advance registration and may be canceled if course enrollment is under 10 registrants. Learn more at <https://www.electrochem.org/short-courses>.

TECHNICAL EXHIBIT

The PRiME Meeting is the right place to exhibit, providing a powerful platform for meeting major new customers while enhancing relationships with current customers from around the world. Traffic in the exhibit hall is generated by coffee and networking breaks along with evening poster sessions.

Your presence at this leading industry event positions your brand as serious and reliable—and it's a great way to build buzz for new products! Combine exhibit opportunities with sponsorships that suit your marketing needs. Contact sponsorship@electrochem.org for further details.

MEETING REGISTRATION

All participants—including authors and invited speakers—are required to pay the applicable registration fees. Meeting registration information is posted on the *PRiME website* as it becomes available. **The deadline for discounted early registration is September 3, 2024.**

HOTEL RESERVATIONS

The PRiME Meeting takes place at the Hawaii Convention Center & Hilton Hawaiian Village. Please refer to the meeting website for the most up-to-date information on hotel availability and blocks of rooms where meeting participants receive special rates. The hotel block is open until **September 3, 2024, or it sells out.**

LETTER OF INVITATION

Letters of Invitation are sent in June 2024 via email to the presenting authors of all accepted abstracts, notifying them of the date, time, and location of their presentations. Anyone requiring an official Letter of Invitation should email abstracts@electrochem.org. These letters do not imply any financial responsibility on the part of the organizers of PRiME 2024.

BIANNUAL MEETING TRAVEL GRANTS

ECS divisions and sections may offer travel grants to assist students, postdoctoral researchers, and young professionals attend ECS biannual meetings, including PRiME 2024. Applications are available beginning **April 12, 2024**, at www.electrochem.org/travel-grants. The submission deadline is **July 8, 2024**.

SYMPOSIA FUNDING ASSISTANCE

Additional financial assistance is limited and generally governed by symposium organizers. To inquire if additional funding is available, contact the organizers of the symposium in which you are presenting.

SPONSORSHIP OPPORTUNITIES

PRiME 2024 provides a wonderful opportunity to solidify and strengthen your brand through sponsorship. Give your brand more visibility and reinforce your position as an industry leader by sponsoring PRiME meeting events. Companies can choose from a wide array of activities from symposia to special events, which deliver worldwide recognition as a supporter of electrochemical and solid state research—and enhance PRiME meetings.

PRiME also offers specific symposium sponsorship. By sponsoring a symposium, your company helps offset travel expenses, registration fees, complimentary proceedings, and/or hosts receptions for invited speakers, researchers, and students. Please contact sponsorship@electrochem.org for further details.

CONTACT INFORMATION

If you have questions or require additional information, contact ECS.



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PRIME 2024 - SYMPOSIUM TOPICS AND DEADLINES

A—Batteries and Energy Storage

- A01—New Approaches and Advances in Electrochemical Energy Systems
- A02—Batteries with Li Chemistries and Beyond: In Honor of Marca Doeff
- A03—Accelerating Next-Generation Battery R&D Through Data-Driven Approaches
- A04—Advanced Characterization Techniques in Battery Research
- A05—Advanced Lithium-Ion Batteries for High-Performance Electric Vehicle Applications
- A06—Fast Energy Storage Materials and Devices
- A07—Li-ion and Li Metal Batteries: Electrodes, Electrolytes, and Interphases
- A08—Materials and Interfacial Electrochemistry for Solid State Batteries
- A09—New Materials for Non-Lithium Based Next-Generation Batteries

B—Carbon Nanostructures and Devices

- B01—Carbon Nanostructures: From Fundamental Studies to Applications and Devices

C—Corrosion Science and Technology

- C01—Corrosion General Poster Session
- C02—High-Temperature Corrosion and Materials Chemistry 16
- C03—Critical Factors in Localized Corrosion 11
- C04—Pits and Pores 10: Nanomaterials—Fabrication, Properties, and Applications
- C05—Atmospheric and Marine Corrosion 3

D—Dielectric Science and Materials

- D01—Photovoltaics for the 21st Century—20th Anniversary: New Materials and Processes
- D02—Semiconductors, Dielectrics, and Metals for Nanoelectronics and Plasma Nanoscience 2

E—Electrochemical/Electroless Deposition

- E01—Electrochemical Deposition for Functional Materials and Energy Applications
- E02—Electrochemical Science and Technology: Challenges and Opportunities in the Path from Invention to Product
- E03—Electrodeposition and Electroless Deposition for Interconnects in Integrated Circuits and 3D Packaging

F—Electrochemical Engineering

- F01—Advances in Industrial Electrochemistry and Electrochemical Engineering
- F02—Modeling Electrochemical Systems for Transportation Applications 3
- F03—Tutorials and Advances in Electrochemical Impedance Spectroscopy
- F04—Anodization and its Applications in Environmental and Energy Research
- F05—Towards Electrolysis for Sustainability: Innovations in Materials and Processes

G—Electronic Materials and Processing

- G01—Atomic Layer Deposition and Etching Applications 20
- G02—18th International Symposium on Semiconductor Cleaning Science and Technology (SCST 18)
- G03—SiGe, Ge, and Related Compounds: Materials, Processing, and Devices 11: In Memory of Qizhi Liu

H—Electronic and Photonic Devices and Systems

- H01—State-of-the-Art Program on Compound Semiconductors 67 (SOTAPOCS 67)
- H02—Thin Film Transistors 17 (TFT 17)
- H03—Low-Dimensional Nanoscale Electronic and Photonic Devices 16
- H04—Gallium Nitride and Silicon Carbide Power Technologies 14

- H05—Electronic, Thermal, and Electrochemical Properties of Metal Organic Frameworks (MOFs) 3: Technology, Applications, and Emerging Devices

- H06—Chromogenic Materials and Devices

- H07—Piezocatalysis

I—Fuel Cells, Electrolyzers, and Energy Conversion

- I01—Polymer Electrolyte Fuel Cells and Water Electrolyzers 24 (PEFC&WE 24)
- I02—Solid State Ionic Devices 15
- I03—Seawater Electrodialysis and Electrolysis for Water-Energy Nexus

J—Luminescence and Display Materials, Devices, and Processing

- J01—Luminescence and Display Materials: Fundamentals and Applications: In Honor of Baldassare Di Bartolo

K—Organic and Bioelectrochemistry

- K01—New Developments in Synthetic Organic Electrochemistry: In Memory of Tatsuya Shono, Tsutomu Nonaka, and Ikuzo Nishiguchi
- K02—Pioneering the Future with Bioengineering and Electrochemistry

L—Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry

- L01—Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session
- L02—Molten Salts and Ionic Liquids 24 (MSIL-24) in Memory of Yasuhiko Ito
- L03—Electrode Processes 15
- L04—Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 14
- L05—Advanced Techniques for In Situ Electrochemical Systems 7
- L06—Electrocatalysis at the Interface: From Fundamental Studies to Applications
- L07—Fundamentals of Carbon Dioxide Reduction

M—Sensors

- M01—Recent Advances in Sensors Systems: General Session
- M02—Chemical Sensors 14

Z—General

- Z01—General Student Poster Session
- Z02—A Lifetime of Cleaning the Planet: In Honor of Akira Fujishima
- Z03—Innovation in Electrochemistry

Important Dates and Deadlines

| | |
|-------------------------------------------------------------------------------------|---------------------------------|
| Meeting abstracts submission opens..... | November 2023 |
| Meeting abstracts submission deadline..... | April 12, 2024 |
| Notification to corresponding authors of abstract acceptance or rejection..... | June 17, 2024 |
| Technical program published online..... | June 2024 |
| Meeting registration opens..... | June 2024 |
| <i>ECS Transactions</i> submission site opens..... | June 21, 2024 |
| Travel grant application deadline..... | July 8, 2024 |
| Meeting sponsor and exhibitor deadline (for inclusion in printed materials)..... | July 26, 2024 |
| <i>ECS Transactions</i> submission deadline..... | July 19, 2024 |
| Travel grant approval notification..... | August 16, 2024 |
| Hotel and early meeting registration deadlines..... | September 3, 2024 |
| Release date for <i>ECS Transactions</i> | On or before September 27, 2024 |

A—Batteries and Energy Storage

A01

New Approaches and Advances in Electrochemical Energy Systems

ECS Energy Technology Division; ECS Battery Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division

The symposium focuses on novel, innovative, and “outside-of-the-box” approaches and developments in materials, components, and systems for addressing the grand challenges in the area of electrochemical energy systems. Of particular interest are innovations in materials, methods, designs, and analytical strategies for realizing sustainable and efficient energy conversion, storage, and transmission, not limited to fuel cells, batteries, capacitors, photoelectrochemistry, and photovoltaics. Contributions to new methods to characterize, model and analyze interfaces, cell and system performances in aqueous and non-aqueous environments are of particular interest to the symposium. The symposium features oral presentations, posters, and invited talks from subject-matter experts.

As a part of this symposium under “Ideas, Interchange and Initiative” (Triple I), abstracts can be submitted based on premature and unexplainable results. The aim of this session is to accomplish a complete exchange of scientific ideas and related difficulties in understanding and interpreting the findings. Speakers are expected to present their results in <10 minutes and reserve the remaining time for discussions between the speaker and the audience to explore solutions and collaboration. Please label your talk as A1—Triple I.

Contributions on flexible electrochemical energy storage materials and devices, covering electrochemistry, emerging electrode and electrolyte materials, fabrication techniques, novel cell and system design/modeling/control strategies, and theoretical simulation are also encouraged.

This symposium is not publishing an issue of *ECS Transactions*. ECS encourages presenters to submit to the ECS family of journals as an alternate publishing opportunity. Learn more at <https://www.electrochem.org/publications>.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Ayyakkannu Manivannan**, West Virginia University, manigpm1@outlook.com; **Brett L. Lucht**, University of Rhode Island, blucht@uri.edu; **Chockalingam Karuppaiah**, Vetri Labs, chock.karuppaiah@vetrilabs.com; **Yuliya Preger**, Sandia National Laboratories, ypreger@sandia.gov; **Nobuyuki Imanishi**, Mie University, imanishi@chem.mie-u.ac.jp; **Yukari Sato**, National Institute of Advanced Industrial Science and Tech. (AIST), yukari-sato@aist.go.jp; **Sang-Young Lee**, Yonsei University, syleek@yonsei.ac.kr; **U Hyeok Choi**, Inha University, uhyeok@inha.ac.kr; **Hyun-Kyung Kim**, Kangwon National University, hkk@kangwon.ac.kr; **Ho Seok Park**, Sungkyunkwan University, phs0727@skku.edu; **Zhong-Shuai Wu**, Dalian Institute of Chemical Physics, wuzs@dicp.ac.cn; **Pooi See Lee**, Nanyang Technological University, pslee@ntu.edu.sg; **Xinliang Feng**, Max-Planck-Institut für Polymerforschung, feng@mpip-mainz.mpg.de; **Taehoon Kim**, Korea Institute of Materials Science, tkim67@kims.re.kr.

A02

Batteries with Li Chemistries and Beyond: In Honor of Marca Doeff

ECS Battery Division

The symposium honors Dr. Marca Doeff for her outstanding and continuous contributions to the development and understanding of Li and Na battery chemistries and to the ECS Battery Division and The Electrochemical Society. The organizers invite contributions on topics including, but not limited to lithium (ion) batteries, sodium (ion) batteries, solid state batteries, and characterization of materials, interphases, and battery cells.

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A03

Accelerating Next-Generation Battery R&D Through Data-Driven Approaches

ECS Battery Division

Data-driven research is crucial to accelerate the discovery and development cycles of new electrochemical energy storage technologies to address the grand challenges of decarbonization. This symposium focuses on energy storage research driven by machine learning, artificial intelligence, simulation, and experimental automation in battery material discovery, parallel prototyping, and system validation. Topics include, but are not limited to data framework and data acquisition, ML-assisted simulation, AI-driven generative material design, automated/autonomous synthesis/characterization, high throughput experimentation, digital twin development, inverse design, etc.

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A04

Advanced Characterization Techniques in Battery Research

ECS Battery Division; ECSJ Committee of Battery Technology; KECS Battery Division

Over the last decades, lithium-ion batteries (LIBs) have successfully been adopted for powering electrical vehicles (EVs). However, to meet the challenges of further replacing the combustion engine vehicle with EVs, advanced LIBs or next-generation batteries with high energy, fast charging, low cost, better safety, and long cycle life must be developed.

To overcome technical challenges, an in-depth understanding of the structural changes of the cathode and anode materials in bulk and at the surface, the interactions between the electrode material and the electrolyte, the formation and functionality of the electrode/ electrolyte interface (SEI and CEI) on the anode and cathode, and the effects of the additives and the surface coatings are critically important. Since those remaining challenges are complicated, none of the single characterization tools can provide a clear answer, and it usually requires multiple strategies to provide comprehensive information in multi-modal/multi-scale approaches. In such circumstances in current battery research, the development and application of advanced characterization techniques are becoming increasingly important.

This symposium aims to be a platform for battery scientists and researchers to discuss recent advances in characterization techniques and share new ideas from them.

The topics include, but are not limited to:

- In situ/operando synchrotron-based X-ray techniques such as X-ray diffraction (XRD), pair-distribution function (PDF), X-ray absorption spectroscopy (XAS), scanning/transmission X-ray microscopy to study fundamental reaction and degradation mechanisms of battery materials and interfaces/interphases;

- Surface-sensitive techniques such as X-ray photoelectron spectroscopy (XPS), soft X-ray absorption spectroscopy, Auger electron spectroscopy (AES), time-of-flight scanning ion mass spectrometry (TOF-SIMS), X-ray photoemission electron microscopy (XPEEM) to study interface issues in LIBs and next-generation batteries;
- In situ TEM and 4D-STEM investigation on LIBs and next-generation batteries;
- Multi-modal/multi-scale approaches with combinations of multiple techniques to solve challenging issues in advanced LIBs and next-generation batteries.

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A05

Advanced Lithium-Ion Batteries for High-Performance Electric Vehicle Applications

ECS Battery Division; ECSJ Committee of Battery Technology; KECS Battery Division

As electric vehicles (EVs) continue to gain traction as sustainable transportation solutions, the demand for high-performance lithium-ion batteries becomes more prominent. The driving range, fast-charging capabilities, overall efficiency, and safety of EVs rely heavily on advancements in the choice of active materials, as well as electrode engineering for lithium-ion batteries. This symposium brings together scientists and researchers to discuss the latest developments in a range of areas, including cathode materials, anode materials, separators, and electrolytes, electrode engineering, and highlights new advancements in enabling advanced lithium-ion batteries. The symposium aims to provide a platform for open discussion on key materials, transformational discovery science in characterization and manufacturing, and the following specific topics:

- Innovative cathode and anode materials and their reaction mechanisms;
- Materials and additives for advanced EV applications (functional separators, electrolyte and additives);
- Engineering for maximizing energy and power densities through thick electrodes and electrode engineering;
- Characterization and simulation for advanced techniques in studying electrode structure and electrochemical properties to optimize performance;
- Advanced techniques for studying electrode structure and electrochemical properties through characterization and simulation.

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A06

Fast Energy Storage Materials and Devices

ECS Battery Division; KECS Capacitor Division; ECSJ Committee of Capacitor Technology

This symposium focuses on the recent progress in high-power electrochemical energy storage processes and devices, especially those designed for high-power/high-energy supercapacitors and fast-charging hybrid energy storage devices. Power capability has a direct impact on the operation efficiency and life of electrochemical energy storage devices. Fast-charging energy storage systems are, urgently needed for the development of electrified vehicles, renewable energy storage systems, and future electronic systems. The symposium welcomes contributions in related fundamental science and practical applications covering electrochemistry, emerging electrode materials and electrolytes, novel cells and system design/modeling/control strategies, advanced characterization techniques, and theoretical simulation.

The organizers invite contributions including, but not limited to the following topics:

- High-energy supercapacitors (EDLC and pseudocapacitors);
- High-power and high-frequency supercapacitors;
- Hybrid supercapacitors (including Li-ion, metal-ion, and dual-ion capacitors);
- Functional supercapacitors (including microcapacitors, AC filtering capacitors, capacitive deionization, and self-powered systems);
- Fast-charging battery hybrid energy storage devices (both aqueous and non-aqueous);
- New hybrid energy storage device designs;
- In situ/operando characterization methods for fast storage process and mechanism;
- Theory and modeling;
- Practical applications of these and related devices.

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A07

Li-ion and Li Metal Batteries: Electrodes, Electrolytes, and Interphases

ECS Battery Division; ECSJ Committee of Battery Technology; KECS Battery Division

Electrochemical electrode-electrolyte interface plays an important role in battery properties such as redox activity, physicochemical processes, charge transfer kinetics, lifetime, and safety. New electrolytes and understanding of the electrochemical processes at the interfaces for Li-ion and new Li metal chemistries are crucial for rational performance improvement. This symposium invites presentations that aim to (1) understand the interphase structure and dynamics at various spatial and temporal resolutions using modelling/advanced in situ/operando characterization techniques, and (2) predict strategies to stabilize the interfaces of high-voltage and high-capacity cathodes and Li metal anode. Topics of interest include, but are not limited to advanced cathodes, new electrolytes, and Li metal anodes

with an emphasis on the electrode-electrolyte interphases (e.g., solid-liquid and solid-solid).

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A08 Materials and Interfacial Electrochemistry for Solid State Batteries

ECS Battery Division; ECSJ Committee of Battery Technology; KECS Battery Division

Rechargeable lithium-ion batteries (LIBs) have been successfully commercialized and are the most attractive power sources for mobile devices. Their market has also expanded to large-scale applications such as electric vehicles and energy storage systems for grid support, in which both energy density and safety requirements are crucial. Despite considerable enhancements in the performance of LIBs, frequent fire/explosion incidents have caused a lot of public concerns over the safety of current LIBs. Recently, the focus of interest has shifted to solid state batteries (SSBs) in which electrolytes are made up of Li⁺-conducting solid materials. The use of solid electrolytes with non- or reduced flammability can keep batteries safe even under harsh and abusive conditions. To realize advanced SSBs, it is necessary to develop highly conductive and stable solid electrolytes as well as composite electrodes with enhanced interfacial stability and optimized electronic/ionic conducting paths. Papers are solicited on recent advances in SSBs with specific emphasis on materials and interfacial electrochemistry including:

- New solid electrolyte materials;
- Advanced electrode design and structures;
- Interface stability and electrochemistry;
- Novel battery architectures;
- Fundamental reaction mechanisms and degradation phenomena.

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A09 New Materials for Non-Lithium Based Next-Generation Batteries

ECS Battery Division; ECSJ Committee of Battery Technology; KECS Battery Division

Lithium or Lithium-ion based rechargeable batteries are currently used as major power sources mostly in portable electronics, power tools, electric vehicles and energy storage systems. However, commercial Lithium or Lithium-ion based rechargeable batteries have unsolved difficult problems such as high cost, unsustainable lithium resource and safety issues. Therefore, the non-lithium-based rechargeable batteries based on alternative metal elements based on monovalent (Na⁺ and K⁺) or multivalent metal ions (Mg²⁺, Ca²⁺, Zn²⁺, Al³⁺, etc.) are regarded as promising candidates to replace the applications of lithium-ion batteries in the near future. Although research and progress is increasing rapidly on non-lithium-based batteries, several challenges still need to be overcome to become a practical and commercial reality.

This symposium focuses on fundamental science and applied engineering for non-lithium based next-generation batteries in electrochemistry using new ion carriers, new electrode and electrolyte materials and new battery system design. The following topics and areas to be discussed include, but are not limited to:

- Electrode materials and chemistry for monovalent and multivalent ion-based rechargeable batteries;
- Liquid (both aqueous and non-aqueous) or solid electrolyte materials for monovalent and multivalent ion based rechargeable batteries;
- Advanced analyses and simulations for fundamental electrochemistry and mechanisms;
- New battery design and performance using new electrochemical energy storage materials.

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B—Carbon Nanostructures and Devices

B01 Carbon Nanostructures: From Fundamental Studies to Applications and Devices

ECS Nanocarbons Division

This broad symposium includes both fundamental and applied studies of fullerenes, carbon nanotubes, graphene, and related materials. Papers are invited in the areas of chemistry, physics, and materials science. Relevant topics include the synthesis and preparation of nanocarbon samples, and characterization of their mechanical, thermal, chemical, electrochemical, optical, or electronic properties. Also welcome are papers concerning nanocarbon applications in areas such as electrochemistry, electronic and opto-electronic devices, sensing, energy conversion and storage, and biomedicine.

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C—Corrosion Science and Technology

C01 Corrosion General Poster Session ECS Corrosion Division

Poster presentations concerning all aspects of corrosion and associated phenomena in liquid and gaseous phases are welcome. Theoretical analysis, experimental investigations, descriptions of new techniques for the study of corrosion, and analyses of corrosion products and films are of interest.

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C02 High-Temperature Corrosion and Materials Chemistry 16 ECS High-Temperature Energy, Materials, & Processes Division; The Electrochemical Society of Japan (ECSJ)

Celebrating its 16th offering, this legacy symposium focuses on the fundamental thermodynamic and kinetic aspects of high-temperature oxidation and corrosion, as well as other chemical reactions involving inorganic materials at high temperatures. Both theoretical and experimental papers are accepted, with industry and student contributions especially encouraged. Specifically, presentations on the following topics in the areas of oxidation/corrosion are solicited: fundamental mechanisms of high-temperature oxidation; reactions in complex environments and/or ultra-high temperatures; and response of protective coatings in these environments. In the area of high-temperature chemistry, papers on the following topics are solicited: thermodynamics property determination; phase equilibria and phase transformations; solid state diffusion; and volatilization or condensation reactions. Fundamental and applied studies of materials interactions in high-temperature chemical processing or power and propulsion applications are also welcome.

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C03 Critical Factors in Localized Corrosion 11 ECS Corrosion Division

The symposium deals with all aspects of localized corrosion and provides a forum to discuss:

- Recent advances in fundamental and applied aspects of breakdown of passivity;
- Techniques to study initiation and propagation of localized corrosion;
- Effect of microstructure;
- Advanced materials;
- Mitigation methods for localized corrosion.

Papers presenting experimental and theoretical approaches to understanding localized corrosion are welcome.

This symposium includes a session dedicated to the application of scanning probe methods in corrosion science, as the development and implementation of these methods have resulted in great advancement of understanding materials degradation at the micro, nano, and atomic scales. Investigations of corrosion mechanisms, film and coating formation/breakdown, and localized behavior using electrochemical probes and electrochemically coupled scanning probe methods are welcomed.

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C04 Pits and Pores 10: Nanomaterials - Fabrication, Properties, and Applications ECS Corrosion Division; The Electrochemical Society of Japan (ECSJ)

The symposium targets the electrochemical formation of pits and pores, characterization of the structures, and their physical and chemical properties as well as their scientific and industrial applications. The diverse research in different fields such as localized corrosion of metallic materials, semiconductor electrochemistry, template materials, deposition into pores, optical properties and magnetic characterization is integrated in this symposium to share knowledge and deepen understanding in the relevant field. The emphasis is on pit and pore formation, relations between porous structure and surface properties, the study and analysis of localized corrosion, work relevant to the formation of advanced materials and their characterization, and applications of these materials in different areas of science and technology.

The symposium brings together scientists and engineers from various research fields such as electrochemistry, materials science, physics, chemistry, engineering, and biology. Papers are invited on, but not limited to topics dealing with experimental as well as theoretical work on:

- Electrochemistry regarding the growth kinetics, stability and morphology of pits and pores;
- Critical environmental factors for maintaining pit and pore growth;
- Critical metallurgical factors (microstructure and texture) influencing the initiation and growth of pits and pores;
- Numerical approach for the analysis on pit and pore growth and novel characterization of pits and pores;
- Analogies and differences in the growth of pores between metallic materials and semiconductors;
- Novel approaches for pore formation on metallic materials and semiconductors;
- Porous materials for secondary materials deposition and filtration;
- Functionalization of the interior of pores for improved surface properties;
- Optical properties and applications of porous materials;
- Biological and biomedical applications of porous materials.

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C05 Atmospheric and Marine Corrosion 3 ECS Corrosion Division; The Electrochemical Society of Japan (ECSJ)

The goal of the symposium is to address a wide spectrum of corrosion research in atmospheric, marine, and other saltwater environments and to provide a forum to examine the most recent ideas and advances in the understanding of corrosion processes, mechanisms, and means of corrosion prevention or control from both a basic and applied research approach. Topic areas may include, but are not limited to:

- 1) General corrosion mechanisms of steels and other materials in seawater and other saltwater media;
- 2) Marine and other atmospheric corrosion of metals and alloys;
- 3) Microbiologically influenced corrosion;
- 4) Environmentally assisted cracking of materials in marine environments;
- 5) Design, processing variables, surface preparation, and pretreatments affecting corrosion and corrosion control;
- 6) Environmentally compliant inhibitors, biocides, and coatings;
- 7) Cathodic protection and innovative anode materials;
- 8) Composites and other advanced materials;
- 9) Use of electrochemical, surface analytical, and nondestructive detection methods;
- 10) Predictive and mechanistic corrosion modeling.

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D—Dielectric Science and Materials

D01 Photovoltaics for the 21st Century - 20th Anniversary: New Materials and Processes ECS Dielectric Science and Technology Division; Electrochemical Society of Japan (ECSJ); The Korean Electrochemical Society (KECS)

This symposium provides a forum for the discussion of terawatt-scale solar-to-electrical conversion technologies that have the potential to scale to meet the global energy demand and become an impactful source of energy in the 21st century. To achieve terawatt scale photovoltaics, it is necessary to focus on the scalability and sustainability of photovoltaics. In addition to lowering the cost and improving efficiency, research is needed in earth-abundant raw materials, energy-efficient fabrication, recycling of waste solar modules, and storage of intermittent solar electricity.

Electrochemical and solid state sciences have major roles to play in removing many of these barriers to terawatt solar photovoltaics. This symposium invites contributions in both current and emerging areas of solar photovoltaic research and covers a whole spectrum of cell technologies from silicon to thin films and emerging technologies. Sample topics of interest include, but are not limited to:

- 1) Scalable and green solution-based processing technologies, material synthesis for solar cells;
- 2) Perovskite, organic, quantum dots including emerging nanomaterials, heterojunction and hybrid solar cells;

- 3) Sustainable practices of waste treatment in solar cell and module fabrication processes;
- 4) Devices and materials for scalable manufacturing, stability and performance;
- 5) Earth-abundant solar materials: synthesis and properties;
- 6) Device degradation and reliability for current and future solar modules including lightweight, wearable, flexible designs;
- 7) Cost-effective approaches to recycle current and future waste solar modules;
- 8) Innovative applications and systems that match the characteristics of solar energy;
- 9) Evaluation and characterization technologies for solar cells and modules.

Invited speakers from industry and academia provide an overview on the current status and explore future directions of solar photovoltaics.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

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D02 Semiconductors, Dielectrics, and Metals for Nanoelectronics and Plasma Nanoscience 2 ECS Dielectric Science and Technology Division

The joint symposium covers cross-field topics of dielectric science and technology.

- 1) New channel materials: SiGe, SiGe:C, GeSn, and III-V channels; SiC and GaN channels: surface/interface modeling; ferroelectric channels; band offsets; surface preparation, surface passivation; contact engineering; negative capacitance devices; transistor characteristics.
- 2) 2D semiconductors and applications: MoS₂, WSe₂, other metal dichalcogenides, graphene, silicene, germanene: growth, characterization, and modeling; high-k gate dielectrics; ohmic contacts; ferroelectric transistors; transistor characteristics.
- 3) Volatile and non-volatile memory: Resistive RAM; ferroelectric RAM; phase-change RAM; magnetic RAM; conductive-bridging RAM; spin-transfer torque RAM; flash memories.
- 4) Interfaces, traps, and reliability: Self-heating of FinFETs; semiconductor/dielectric, dielectric/dielectric, dielectric/metal interfaces; interface and bulk dielectric defects/traps; electrical characterization, dielectric wear out, SILC; NBTI and PBTI; TDDB.
- 5) High-k gate dielectrics: OnSi, SiGe, Ge, III-V compounds, SiC, etc.; on nanowires, nanotubes, 2D materials and graphene.
- 6) Nanoelectronics and nanotechnology: FinFET, multi-gate MOSFETs, nanotubes, nanowires, neuromorphic devices, quantum dots, spintronics, plasmonics, tunnel FETs. metal gate electrodes metals and ohmic contacts: threshold and flat band voltage control, metal contacts to nanowires, nanotubes, graphene, MoS₂, etc.

- 7) **Plasma Nanoscience:** This symposium also includes a special session on plasma nanoscience, aiming to provide a forum for extensive and in-depth discussions in the field of plasma nanoscience and nanotechnology as well as developing the next-generation plasma-based nanotechnologies and applications. It is planned as an expert meeting that provides an overview of some of the most important research directions in this field, followed by comments and detailed discussions of the main challenges and strategic directions for future development in relevant areas.

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- 11) **Emerging and nanostructured materials for photovoltaics, (photo-)electrochemical conversion, electrocatalysis, hydrogen fuel, CO₂ capture, energy storage, batteries, supercapacitors and fuel cells.**

This symposium provides a space for fruitful discussions including aspects related to both fundamental research and technological innovations.

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E—Electrochemical/Electroless Deposition

E01

Electrochemical Deposition for Functional Materials and Energy Applications

ECS Electrodeposition Division; ECS Energy Technology Division

Electrochemical deposition is widely used in the fabrication of materials and devices, and most recently this technique has been successfully applied to the fabrication of various components in energy conversion and storage systems. The symposium covers the most recent advances in electrolytic and electroless growth of thin films and nanostructures including fundamentals, methods, and application. Submissions about the applications of electrochemical deposition related to electronics, energy conversion, aerospace, biomedical, and automotive industries are solicited to review and discuss the latest developments and suggest future directions.

Original contributions are sought but not limited from the following areas:

- 1) Under-potential deposition, surface-limited replacement of films and nanostructures;
- 2) Electrodeposition of alloys: Under-potential co-deposition, anomalous co-deposition;
- 3) Electrodeposition from ionic liquids;
- 4) Electroless deposition: Principles and applications;
- 5) Metallization of non-conductive surfaces;
- 6) Novel ideas, conditions, and methods for atomic/nanoscale control of thin films morphology and structure;
- 7) Deposition methods and approaches to control microstructure (texture and grain size), mechanical, and electrical properties;
- 8) Electrochemical design of tailored (nano) and mesoporous structures: Dealloying, electrochemical, and chemical processing;
- 9) Electrochemical anodization at surfaces and generation of nanostructures;
- 10) Electrochemical synthesis of oxides, semiconductors, and compounds: 2D and 3D;

E02

Electrochemical Science and Technology: Challenges and Opportunities in the Path from Invention to Product

ECS Electrodeposition Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division

The path from discovery, invention, and scientific understanding to well-engineered products and processes is complex and involves integration of a wide range of skills and perspectives. This is particularly true in electrochemical engineering, where the development of viable processes in energy, environment, health care or information technology requires understanding of molecular mechanisms, tailoring new materials, and integrating data over a wide range of scales to scale-up, design, and develop manufacturing methods to produce reliable devices and products at low cost. A clear understanding and creative application of the fundamentals are essential to successfully address these challenges.

The goal of this symposium is to draw together the collective interests of scientists and engineers involved in electrochemical education and skilled in moving along the path from ideas to profits, who articulate the best practices leading from invention to a technologically and commercially successful product. This path is only possible by also emphasizing transformative educational opportunities and defining challenges to equip students and practitioners with the skills and perspectives emerging from these activities. The reduction to routine use of the approaches discussed here will define essential engineering methods for emerging electrochemical applications for which increased predictability is of high importance.

Of interest are reusable engineering methods that have emerged from diverse applications such as nano-bio-micro-devices, photovoltaic converters, batteries, biomedical devices, etc. Such methods might include examples of exploratory work that target the need for detailed fundamental understanding, perhaps at the molecular level; methods for early establishment of engineering goals for a proposed product; examples of manipulating solution chemistry and cell materials to meet production realities; methods for guiding discovery of novel materials and predicting their interactions with other cell components; development of process control methods for insuring quality at the atomic scale; mathematical modeling of continuum and/or stochastic behavior of cell components as well as entire systems including prediction of behavior at multiple scales;

estimating unknown parameters, quantifying uncertainty, and linking the pieces to optimize an overall system.

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E03 Electrodeposition and Electroless Deposition for Interconnects in Integrated Circuits and 3D Packaging

ECS Electrodeposition Division; The Electrochemical Society of Japan (ECSJ)

This symposium focuses on challenges and prospects related to electrochemical processes for traditional damascene interconnects, and emerging 3D integration and various packaging technologies in integrated circuits. Electrochemical and electroless deposition methods are widely used in metallization for electrical connections. Advances in the performance of integrated circuits are achieved by miniaturization and denser packaging—both requiring advances in electrochemical fabrication methods and the fundamentals underlying these methods. Topics of special interests for this symposium include, but are not restricted to:

- 1) Additives chemistry for feature-filling and morphology control;
- 2) New materials and approaches for lowering interconnect resistance;
- 3) Materials property advancements including stress control in electrodeposits;
- 4) Advanced barrier and liner layers, and techniques for their fabrication;
- 5) Planarization methods including CMP as they relate to advances in materials;
- 6) New process integration methodologies;
- 7) Modeling and simulations of relevant processes.

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F—Electrochemical Engineering

F01 Advances in Industrial Electrochemistry and Electrochemical Engineering

ECS Industrial Electrochemistry and Electrochemical Engineering Division

Papers are solicited in areas of industrial electrochemistry and electrochemical engineering that are not covered by other symposia at this meeting. Of particular interest are papers concerning: design, operation, testing and/or modeling of industrial electrochemical systems; electrochemical waste treatment technologies, methods for

electrosynthesis; electrolytic recovery of process materials; new electrode materials, new electrochemical cell designs; and electrocatalysis. Presentations are also encouraged on industrially significant areas such as chlor-alkali and fluorine production; manufacture of aluminum and other metals; use of electrochemical methods in pulp and paper bleaching; and generation of environmentally friendly bleaching chemicals and other active oxidants. Papers may contain both theoretical and experimental work, and papers dealing with either area are considered.

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F02 Modeling Electrochemical Systems for Transportation Applications 3

ECS Industrial Electrochemistry and Electrochemical Engineering Division; ECS Battery Division; ECS Energy Technology Division

This session focuses on modeling, at all scales, electrochemical systems for transportation applications. Of particular interest are presentations covering modeling of electrochemical energy conversion and/or storage devices, and their integration into transportation systems, most particularly automobiles. Of interest as well are presentations detailing peripheral systems and balance-of-plant that impact the operation of electrochemical systems applied to transportation.

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F03 Tutorials and Advances in Electrochemical Impedance Spectroscopy

ECS Industrial Electrochemistry and Electrochemical Engineering Division; ECS Corrosion Division

Electrochemical impedance spectroscopy has applications in fields such as corrosion, biomedical devices, semiconductors and solid state devices, sensors, batteries, fuel cells, electrochemical capacitors, dielectric measurements, coatings, electrochromic materials, analytical chemistry, electrocatalysis, and imaging. This symposium provides a forum for tutorial and research presentations concerning all aspects of electrochemical impedance spectroscopy. Contributions related to both fundamentals and applications are encouraged. Papers are solicited as well in the development of novel experimental methods, mathematical models, instrumentation, and methods for interpretation of data. The tutorials should be useful for students and professionals seeking to diversify their background or break into new technological areas. The symposium consists of both invited and contributed papers.

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F04

Anodization and its Applications in Environmental and Energy Research

ECS Industrial Electrochemistry and Electrochemical Engineering Division; The Korean Electrochemical Society (KECS)

Anodic processes can form a wide range of metal oxide nanostructures on any refractory metal and many semiconductors on a scale from nm to mm. The symposium deals with all aspects of anodic reaction systems such as anodization mechanisms of advanced materials, formation of self-organized metal oxides, surface modification of metals and semiconductors as well as state-of-art applications such as binder-free electrode, catalysis, and environmental/energy applications. Papers presenting experimental as well as theoretical and modelling aspects of anodization systems and processes are considered. This symposium shows the current state of anodic synthesis engineering science and practice, novel anodization method and new materials, as well as innovative methodologies, and hopefully suggests a way forward.

The symposium encourages abstract submissions in the following areas:

- Anodic self-organization (experimental and theoretical approaches);
- Electrochemical anodization on surfaces, generating functional nanostructures;
- Anodization of metals/semiconductors/alloys;
- Electrochemical doping in anodic oxides;
- De-alloying or anodic conversion of metal to multi-purpose functional metal oxide structures;
- High aspect ratio or extreme thin anodic oxide film: Anti-corrosion and coloring purposes;
- Novel applications of electrochemically synthesized anodic materials.

This symposium is not publishing an issue of *ECS Transactions*. ECS encourages presenters to submit to the ECS family of journals as an alternate publishing opportunity. Learn more at <https://www.electrochem.org/publications>.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Kiyoung Lee**, Inha University, kiyoung@inha.ac.kr; **Sungmo Moon**, Korea Institute of Materials Science, sungmo@kims.re.kr; **Hiroki Habazaki**, Hokkaido University, habazaki@eng.hokudai.ac.jp; **Junghoon Lee**, Pukyong National University, jlee1@pknu.ac.kr.

F05

Towards Electrolysis for Sustainability: Innovations in Materials and Processes

ECS Industrial Electrochemistry and Electrochemical Engineering Division; The Korean Electrochemical Society (KECS)

Electrolysis is a versatile and sustainable technology that has applications in various industries, including ammonia synthesis, carbon dioxide reduction, electrochemical remediation, electrocoagulation, water disinfection, salinity gradient or microbial energy conversion, and electroadsorption. To accelerate the adoption of electrolysis for sustainable industrial processes, this symposium focuses on innovative materials and processes that can enhance the efficiency, selectivity, and sustainability of electrolysis systems in these application areas. By bringing together experts from diverse disciplines, we aim to promote knowledge exchange, collaboration, and innovation towards a greener and more efficient future.

The symposium encourages abstract submissions in the following areas:

- Novel electrode materials and their characterization;
- New catalysts for electrolysis reactions;
- Innovative electrolysis cell designs and configurations;
- Advanced membrane materials and structures;
- Electrolyte solutions for enhanced efficiency and selectivity;
- Environmental impact assessments of electrolysis technologies.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Jin Soo Park**, Sangmyung University, energy@smu.ac.kr; **Sang Hoon Kim**, Korea Institute of Science and Technology, kim_sh@kist.re.kr; **Sunghyun Uhm**, Institute for Advanced Engineering, electrik@iae.re.kr; **K. Andreas Friedrich**, Universität Stuttgart, andreas.friedrich@dlr.de; **Mitsuru Higa**, Yamaguchi University, mhiga@yamaguchi-u.ac.jp; **Damilola A. Daramola**, Ohio University, daramola@ohio.edu; **Paul J. A. Kenis**, University of Illinois at Urbana-Champaign, kenis@illinois.edu.

G—Electronic Materials and Processing

G01

Atomic Layer Deposition and Etching Applications 20

ECS Electronics and Photonics Division; ECS Dielectric Science and Technology Division

Continued progress in nanotechnology and nanomanufacturing requires precise, conformal coatings of thin film materials. Atomic layer deposition (ALD) enables the deposition of ultra-thin, highly conformal coatings over complex, 3D topographies with precise control over both thickness and composition. Consequently, ALD has become the technology of choice for a large variety of applications beyond microelectronics. Over the last 19 years, this symposium has earned a leading position among the meetings where not only ALD is discussed, but also the closely related topics of atomic layer etching, atomic layer cleaning, area-selective deposition, and molecular layer deposition (MLD), the group commonly referred to as atomic layer processing (ALP).

This symposium offers an excellent forum for sharing cutting-edge research on both existing and emerging ALD applications, as well as fundamental aspects of ALP technology.

Contributions are solicited in the following areas:

- 1) Semiconductor CMOS applications: Development and integration of ALD high-k oxides and metal electrodes with conventional and high-mobility channel materials;
- 2) Volatile and non-volatile memory applications: Extendibility, Flash, MIM, MIS, RF capacitors, etc.;
- 3) Interconnects and contacts: Integration of ALD films with Cu and low-k materials;
- 4) Fundamentals of ALD processing: Reaction mechanisms, in situ measurement, modeling, theory;
- 5) New precursors and delivery systems;
- 6) Optical and photonic applications;
- 7) Coating and functionalizing of nanoporous materials and membranes by ALD and MLD;
- 8) MLD and hybrid ALD/MLD;
- 9) ALD for energy conversion applications such as fuel cells, photovoltaics, etc.;
- 10) ALD for energy storage applications;
- 11) Productivity enhancement, scale-up and commercialization of ALD equipment and processes for rigid and flexible substrates, including roll-to-roll deposition;
- 12) Area-selective ALD;
- 13) Atomic layer etching (reverse ALD) and related topics aiming at self-limited etching, such as atomic layer cleaning, etc.;
- 14) Aspects of metrology in and for ALP.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Fred Roozeboom**, Universiteit Twente, f.roozeboom@utwente.nl; **Stefan De Gendt**, Katholieke Universiteit Leuven, Stefan.Degendt@imec.be; **Jolien Dendooven**, Universiteit Ghent, Jolien.Dendooven@UGent.be; **Jeffrey Elam**, Argonne National Laboratory, jelam@anl.gov; **Oscar van der Straten**, IBM Corporation Research Center, ovander@us.ibm.com; **Andrea Illiberi**,

ASM Europe, andrea.illiberi@asm.com; **Ganesh Sundaram**, Veeco, gsundaram@veeco.com; **Rong Chen**, Huazhong University of Science and Technology, rongchen@mail.hust.edu.cn; **Oana Leonte**, Berkeley Polymer Technology, oana.leonte@yahoo.com; **Thorsten Lill**, Lam Research, thorsten.lill@lamresearch.com; **Matthias Young**, University of Missouri-Columbia, matthias.young@missouri.edu; **Bhaskar Bhuyan**, Applied Materials, Inc., Bhaskar_Bhuyan@amat.com; **Alexander Kozen**, University of Vermont; Alexander.Kozen@uvm.edu.

G02 18th International Symposium on Semiconductor Cleaning Science and Technology (SCST 18) ECS Electronics and Photonics Division

This symposium is a forum to present and discuss the latest results on the science and technology of surface cleaning in semiconductor device manufacturing. This symposium has been organized under the auspices of The Electrochemical Society every other year since 1989. It covers a wide range of topics related to the science and technology of contaminants removal, atomic layer etching, and surface conditioning of elemental and compound semiconductors such as Si(SOI), SiC, Ge, SiGe, III-V, II-VI and non-semiconductors such as sapphire, glass, ITO, plastic surfaces; cleaning media, including non-aqueous cleaning methods and tools; FEOL and BEOL cleaning operations and pattern collapse prevention; integrated cleaning; cleaning of 3D structures and 3D stacked ICs, cleaning of MEMS; DUV and EUV masks; high-k and porous low-k dielectrics; post-CMP cleaning; wafer bevel cleaning/polishing; photoresist and residue removal, characterization, evaluation, and monitoring of cleaning; correlation with device performance; cleaning of equipment and storage/handling hardware; cleaning related issues specifically in the case of 450mm wafers and ultra-thin wafers. Also, surface cleaning and conditioning topics involved in atomic scale processes, quantum devices, large-area electronics and photonics, both non-organic and organic TFT technology, compound semiconductor device processing, 2D (graphene, metal dichalcogenides), 1D (nanowires, nanotubes) and 0D (nanodots) material systems cleaning, surface conditioning/functionalization-related aspects of self-assembled-monolayers for selective deposition processes as well as other issues within the broadly understood scope of this symposium. Only original, non-commercial contributions are accepted for presentation. Contributions that are primarily commercial in nature are rejected. Depending on the number of accepted papers, a poster session may be scheduled in addition to oral presentations.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Sangwoo Lim**, Yonsei University, swlim@yonsei.ac.kr; **Takeshi Hattori**, Hattori Consulting International, hattori@alumni.stanford.edu; **Koichiro Saga**, Sony Semiconductor Solutions Corporation, koichiro.saga@jp.sony.com; **Paul W. Mertens**, Katholieke Universiteit Leuven, paul.mertens@imec.be; **Ismail Kashkoush**, Aktron Technologies, Inc., ikashkoush@akriontech.com; **Jason Keleher**, Lewis University, keleheja@lewisu.edu

G03 SiGe, Ge, and Related Compounds: Materials, Processing, and Devices 11: In Memory of Qizhi Liu ECS Electronics and Photonics Division; ECS Dielectric Science and Technology Division

This meeting provides a forum for reviewing and discussing materials- and device-related aspects of SiGe, Ge, and related compounds (e.g., SiC). There are 10 areas of interest for the symposium:

- Heterojunction Bipolar Transistors: Device physics, process technology, modeling, reliability, circuit applications (analog, digital, and RF to mm-wave).
- FET Technology: Advanced CMOS, compound semiconductor devices (III-V, Group IV), 2-D materials FET, TFET, FDSOI, FinFETs, nanowire FETs, negative-capacitance FET, and oxide TFTs, ferroelectric FETs.

- Optoelectronics: Detectors, waveguides, quantum cascade structures, photovoltaic cells, photoluminescence, electroluminescence, integration with CMOS electronics, Ge buffers for III-V optoelectronics on Si, monolithic optoelectronic integrated circuits (OEICs).
- Epitaxy: Pre-epi surface preparation of Si, SiGe and Ge; growth of Group IV epitaxial layers: graphene, Si, Ge, SiC, SiGe, SiGe:C, GeSn, SiGeSn. Epitaxial growth of other materials on Si or Ge such as III-V's; novel growth techniques and precursors; selective growth; novel in situ doping approaches; quantum wire/dot growth.
- Emerging Applications: Nano-structured devices, quantum computing, THz devices, electro-mechanical properties of SiGe layers, MEMs, TFTs, amorphous SiGe layer applications.
- Processing: All aspects of processing including diffusion, diffusion suppression, oxidation, strain, thermal mixing, defects, Si and Ge intermixing, oxidation and nitridation, cleaning and etching of SiGe, Ge, and SiGeC films.
- Strain Engineering: Relaxed SiGe buffer layers, pseudomorphic SiGe, superlattices, embedded SiGe, Ge condensation, SSOI, SGOI substrates, global strain, local/process-induced strain, strain characterization, strain modeling and simulation, defects, manufacturing issues.
- Surfaces and Interfaces: High-k interface, metal contact, interfacial electrical properties and its characterization. Electromechanical properties of SiGe layers, MEMs, TFTs.
- Related Compounds: Deposition, processing, characterization, and devices of and with related compounds, such as SiC, 2D materials (graphene, silicene, germanene, h-BN, transition metal dichalcogenides), semi-conducting metal oxides.
- Metrology and Characterization: Nanoscale characterization of composition, strain, defectivity, crystallinity, doping, dimensions, morphology, band structure, mobility... of Group IV (incl. C and Sn alloys) and III/V on Si as well as 2D materials.
- Evening Workshop: A panel of experts discusses issues related to a topic in SiGe, Ge, or related compounds.

This symposium is dedicated to the memory of Qizhi Liu, the former chair of this symposia series.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Jean-Michel Hartmann**, CEA-Leti Minatec, jean-michel.hartmann@cea.fr; **Mikael Oestling**, Kungliga Tekniska högskolan, mostling@kth.se; **Vibhor Jain**, GlobalFoundries US Inc., Vibhor.Jain@globalfoundries.com; **Xiao Gong**, National University of Singapore, elegong@nus.edu.sg; **Gianlorenzo Masini**, Cisco Systems, masini@cisco.com; **Judson Holt**, GlobalFoundries US Inc., 2 LLC, Judson.Holt@globalfoundries.com; **Andreas Mai**, Leibniz-Institut für innovative Mikroelektronik - IHP Microelectronics, mai@ihp-microelectronics.com; **Atsushi Ogura**, Meiji University, a_ogura@meiji.ac.jp; **Osamu Nakatsuka**, Nagoya University, nakatsuka@nagoya-u.jp; **Wengang Bi**, The Chinese University of Hong Kong, Shenzhen, wbi@hebut.edu.cn; **Andreas Schulze**, Applied Materials, Inc., Andreas_Schulze@amat.com.

H—Electronic and Photonic Devices and Systems

H01 State-of-the-Art Program on Compound Semiconductors 67 (SOTAPOCS 67) ECS Electronics and Photonics Division

Compound semiconductors are a significant enabler of numerous optoelectronic, high-speed, power, and sensor devices. The SOTAPOCS 67 symposium addresses the most recent developments in inorganic compound semiconductor technology, including traditional III-V

materials, III-nitrides, II-VI materials, silicon carbide, diamond, and other emerging materials. Papers on both practical and fundamental issues are solicited. The following areas are of particular interest:

- 1) Advances in bulk and epitaxial growth techniques;
- 2) Advances in device processing;
- 3) Novel electronic, optoelectronic, and sensor devices;
- 4) Schottky and ohmic contact technology;
- 5) Dielectric properties and passivation;
- 6) Wafer bonding and packaging;
- 7) In situ and ex situ process monitoring;
- 8) Materials characterization and wafer level testing and mapping;
- 9) Process-induced defects;
- 10) Reliability and device degradation mechanisms;
- 11) Demonstration of state-of-the-art devices and applications.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Jennifer Hite**, US Naval Research Laboratory, jennifer.hite@nrl.navy.mil; **Travis J. Anderson**, US Naval Research Laboratory, travis.anderson@nrl.navy.mil; **Erica Douglas**, Sandia National Laboratories, edougla@sandia.gov; **Robert Lynch**, University of Limerick, Robert.Lynch@ul.ie; **Qiliang Li**, George Mason University, qli6@gmu.edu; **Wayne Johnson**, Soundside Partners, jwaynejohnson@gmail.com; **Colm O'Dwyer**, University College Cork, c.odwyer@ucc.ie; **Yuji Zhao**, Arizona State University, yuji.zhao@asu.edu.

H02 Thin Film Transistors 17 (TFT 17)

ECS Electronics and Photonics Division; ECS Dielectric Science and Technology Division

This is the 34th year of the symposium, which is sponsored by the ECS Electronics and Photonics Division. This symposium provides a forum for the presentation and discussion of the latest developments in thin film transistors (TFTs) and related fields. It is an opportunity for synergistic interactions among those working in TFTs, other high-tech fields, or related products or research areas. Papers dealing with all aspects of fabrication processes, materials, devices, designs, characterization, and applications of TFTs are solicited. Examples of topics to be addressed in this symposium are:

- TFT technology progress and production status;
- Advanced processes;
- Thin film materials;
- Device physics, characterization, and reliability ;
- Applications;
- TFT array driving and integrated circuits;
- Large-area process equipment, testers, etc.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Yue Kuo**, Texas A&M University, yuekuo@yemail.com.

H03 Low-Dimensional Nanoscale Electronic and Photonic Devices 16

ECS Electronics and Photonics Division; ECS Dielectric Science and Technology Division

The 16th LDEPD symposium addresses the most recent developments in nanoscale transparent electronic, photonic materials, and devices. The symposium encompasses low-dimensional and transparent novel materials and devices, processing, device fabrication, reliability, and other

related topics. Papers on both practical issues and fundamental studies are solicited. The symposium consists of both invited and contributed papers.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Yu-Lun Chueh**, National Tsing Hua University, ylchueh@mx.nthu.edu.tw; **Jyh Ming Wu**, National Tsing Hua University, jmwuyun@gmail.com; **Colm O'Dwyer**, University College Cork, c.odwyer@ucc.ie; **Motofumi Suzuki**, Kyoto University, m-suki@me.kyoto-u.ac.jp; **Song Jin**, University of Wisconsin-Madison, jin@chem.wisc.edu; **Sang-Woo Kim**, Sungkyunkwan University, kimswl1@skku.edu; **Federico Rosei**, Institut national de la recherche scientifique, rosei@emt.inrs.ca; **Johnny Ho**, City University of Hong Kong, johnnyho@cityu.edu.hk; **Zhiyong Fan**, Hong Kong University of Science and Technology, eezfan@ust.hk; **Qiliang Li**, George Mason University, qli6@gmu.edu; **Jr-Hau He**, City University of Hong Kong, jrhauhe@cityu.edu.hk; **Gary W Hunter**, NASA Glenn Research Center, Gary.W.Hunter@nasa.gov; **Kuniharu Takei**, Osaka Prefecture University, takei@pe.osakafu-u.ac.jp; **Lance Li**, University of Hong Kong, lanceli1@hku.hk; **Peter Mascher**, McMaster University, mascher@mcmaster.ca.

H04 Gallium Nitride and Silicon Carbide Power Technologies 14

ECS Electronics and Photonics Division

The 14th edition of this symposium continues to showcase the state of the art in the development of GaN and SiC wide bandgap as well as high Al-content AlGaN, gallium oxide and other ultra-wide bandgap material and device technologies for power switching and power amplifier applications. Scope includes all aspects related to these technologies and their applications: bulk and thin film growth and characterization of materials; defect characterization and reduction techniques; growth chamber design and modeling; doping and carrier lifetime control techniques; high-frequency low-loss power magnetic materials; novel power devices and device structures; power device fabrication technologies; chip-scale capacitor, inductor and transformer structures and fabrication technologies; novel physical mechanisms including micro plasma and current filamentation; short-term and long-term device degradation and failure mechanisms; novel accelerated stress testing and lifetime prediction methodologies; device characterization and modeling for performance and reliability; manufacturing cost and yield improvement approaches; homogeneous and heterogeneous chip-scale integration; power converters and power amplifiers; packaging and thermal management; and cooling of power chips and modules.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Michael Dudley**, State University of New York at Stony Brook, michael.dudley@stonybrook.edu; **Balaji Raghathamachar**, State University of New York at Stony Brook, balaji.raghathamachar@stonybrook.edu; **Noboru Ohtani**, Kwansai Gakuin University, Ohtani.Noboru@kwansai.ac.jp; **Mietek Bakowski**, RISE Acreo, Mietek.Bakowski@ri.se.

H05 Electronic, Thermal, and Electrochemical Properties of Metal Organic Frameworks (MOFs) 3: Technology, Applications, and Emerging Devices

ECS Electronics and Photonics Division; ECS Energy Technology Division; ECS High-Temperature Energy, Materials, & Processes Division

During recent years, research on electronic, thermal, and electrochemical properties of metal-organic framework (MOF) materials and applications

has created a new research field. The work of various international research groups has contributed to discoveries of new physicochemical properties of MOFs with high application potentials. MOF synthesis and characterization have been supported by recent advances in theoretical models leading to better understanding of the fundamental materials science of MOFs. Today, highly porous and layered MOF materials have been successfully integrated into new technological applications ranging from microelectronics to sensors, batteries and photovoltaic devices as well as to functional thin film materials in the field of electrochemistry, optoelectronics, thermoelectrics, magnetism, data storage, as well as to photo-/electrocatalysis chemical reactors and gas storage.

This symposium brings together researchers in chemistry, materials science, physics, devices and process engineers and related interdisciplinary areas, to seek and capture the state of the art in MOF-based fundamental aspects and latest technological applications. This symposium offers a new interdisciplinary and international platform and aims to contribute toward advancing the fundamental understanding of MOFs and improving technological applications thereof. Original contributions are solicited that cover all fundamental and applied aspects including electronic, thermal, and electrochemical transport properties and phenomena, device/system fabrication and integration of MOFs into emerging technological device applications.

All oral presentations are grouped into topical sessions. Invited keynote speakers present critical reviews covering recent advances and future directions in the diverse field of fundamental and applied MOF properties.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Christopher W Wilmer**, University of Pittsburgh, wilmer@pitt.edu; **Helmut Baumgart**, Old Dominion University Applied Research Center, hbaumgar@odu.edu; **Christof Woell**, Karlsruher Institut für Technologie, christof.woell@kit.edu; **Hiroshi Kitagawa**, Kyoto University, kitagawa@kuchem.kyoto-u.ac.jp; **Paolo Falcaro**, Technische Universität Graz, paolo.falcaro@tugraz.at; **Mark D. Allendorf**, Sandia National Laboratories, mdallen@sandia.gov; **Sanjeev Mukerjee**, Northeastern University, s.mukerjee@northeastern.edu; **Gang Wu**, University at Buffalo, gangwu@buffalo.edu.

H06 Chromogenic Materials and Devices

ECS Electronics and Photonics Division, ECSJ Chromogenic Research; The Korean Electrochemical Society (KECS)

The renewed interest in smart windows that dynamically modulate solar light and heat flux has been boosted in both academic and industrial sectors due to their huge impact on energy saving in buildings and vehicles. This symposium focuses on physicochemical aspects of electrochromism, photochromism, thermochromism and gaschromism in both organic and inorganic materials and dynamic mirrors based on reversible metal deposition and addresses current and emerging technical and scientific issues. Presentations at this meeting encompass broad aspects of chromisms induced by electron, light, heat, and gas with various materials such as inorganic metal oxides, metallohexacyanate, transition-metal coordination complexes, small molecules, polymers, conjugated polymers, organic near-infrared electrochromic materials, plasmonic nanocrystals, as well as transparent electrical conductors, electrolytes, and their device performance. In addition, this symposium also includes fundamental studies, incorporating characterization techniques of advanced electrochromic, photochromic, thermochromic, and gaschromic devices and theoretical studies on various chromisms. Papers can also discuss the application of various chromogenic materials in practical systems. This symposium also features sessions around chromogenic materials for building energy efficiency improvement.

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H07 Piezocatalysis

ECS Energy Technology Division; ECS Dielectric Science and Technology Division; ECS Electronics and Photonics Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division; The Electrochemical Society of Taiwan (ECSTw)

The rapidly growing demand for energy conversion, environmental remediation, and biomedical applications motivated the exploration of next-generation advanced catalysts. The critical factors of advanced catalysts include low recombination rate, lowcost, highenergy conversion efficiency, high charge transfer process, and biocompatibility. This symposium aims to bring together cutting-edge ideas to address a broad spectrum of piezocatalysis, flexocatalysis, piezophotocatalysis, and their coupling effects. Techniques of interest include but are not limited to piezocatalysis, flexocatalysis, piezophotocatalysis, photonic effect, and state-of-the-art advanced materials for research applications in energy conversion, environmental remediation, biomedical, etc. The symposium welcomes contributions to the related fundamental science of piezocatalysis, energy materials, materials and processes, novel working mechanisms, and advanced characterization techniques.

The organizers invite contributions on the following topics:

- 1) Piezocatalysis, flexocatalysis, and piezophotocatalysis for environmental remediation, water splitting, clean energy, reducing the carbon footprint, and biomedical applications;
- 2) Piezoelectric potential and phototronic effects for enhancing the performance of solid state electronics;
- 3) Systematic design and theoretical calculations/modeling;
- 4) Practical applications for the related topics of piezocatalysis, flexocatalysis, and piezophotocatalysis.

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I—Fuel Cells, Electrolyzers, and Energy Conversion

I01 Polymer Electrolyte Fuel Cells and Water Electrolyzers 24 (PEFC&WE 24)

ECS Energy Technology Division; ECS Battery Division; ECS Corrosion Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division; ECS Physical and Analytical Electrochemistry Division; ECSJ PEFC; KECS Fuel Cells and Electrolyzers Division

Polymer electrolyte fuel cells and water electrolyzers (PEFC&WEs) are key technologies for decarbonization. The intention of the PEFC&WE symposium is to bring together the international community working on proton exchange membrane (PEM) and anion exchange membrane

(AEM) fuel cells and electrolyzers, as well as high-temperature PEM (HT-PEM) and liquid-alkaline water electrolysis technologies, to enable effective interactions between their research and engineering communities. To maximize the synergies between these fuel cell and electrolyzer technologies, the symposium is structured as seven complimentary sections covering:

- A) Fuel cell catalysts;
- B) Electrolysis catalysts;
- C) Fuel cell and electrolyzer ionomers, membranes and separators;
- D) Fuel cell electrodes, membrane electrode assemblies (MEAs) and diagnostics;
- E) Electrolyzer electrodes, MEAs and diagnostics;
- F) Fuel cell and electrolyzer cells, stacks and systems;
- Z) A full day plenary session on leading fuel cell and electrolyzer developments.

Abstracts will be considered for other PEM- and AEM-based electrochemical devices like electrochemical hydrogen pumps, but CO₂ electrochemical reduction, high-temperature (solid oxide) fuel cells and electrolysis and photochemical water splitting, are covered by other symposia.

PEFC&WE24 supports student and postdoctoral participation and encourages the development of new and talented researchers in the field. We expect that approximately 10 Student/Postdoc Travel Grants will be awarded for PEFC&WE24 to encourage broad participation of graduate students and postdoctoral fellows new to the topic research areas. To apply for a PEFC&WE24 travel award, students must submit a manuscript to *ECS Transactions* for the PEFC&WE24 symposium (due July 19, 2024), and then a copy of their manuscript and resume to Dr. Karen Swider Lyons (kswiderlyons@plugpower.com). Additionally, there is a student poster contest with prizes for posters with the best technical and visual quality, as selected by a technical panel at the conference. Students who submitted abstracts to the PEFC&WE24 symposium and wish to be eligible for a poster award should send a copy of their accepted abstract to Prof. Iryna Zenyuk (iryna.zenyuk@uci.edu).

The specific subjects covered by each section are described below. Abstracts for oral or poster contributions must be submitted to one of the I01 PEFC&WE24 sections via the ECS website by April 12, 2024, in accordance with ECS guidelines and deadlines. All accepted abstracts are invited to submit a paper to *ECS Transactions* for PEFC&WE24, due July 19, 2024.

Section A: Fuel Cell Electrocatalyst Activity and Durability

Organizers: H. Uchida, P. Strasser, Y.-T. Kim, U. Kramm, K. Kakinuma, J.-W. Han

Presentations related to the synthesis, electrochemical characterization, and computation of high activity and durable electrocatalyst and supports for the oxygen reduction reaction (ORR) and hydrogen oxidation reaction (HOR) in acidic and alkaline fuel cells including:

- 1) Synthesis, activity and durability of cathode and anode catalysts;
- 2) Durable and functional catalyst supports;
- 3) Approaches for thriving precious metals;
- 4) Novel catalysts including non-noble metal-based electrocatalysts, oxide-supported metals, and single-atom electrocatalysts;
- 5) Computational discovery and design of new electrocatalysts.

Section B: Electrolyzer Electrocatalyst Activity and Durability

Organizers: B. S. Pivovar, H. Xu, S. Mitsushima, M. Chatenet, D.-H. Ha, S.-H. Joo

Presentations related to the synthesis, electrochemical characterization and computation of high activity and durable electrocatalysts and supports for the oxygen evolution reaction (OER) and hydrogen evolution reaction (HER) in acidic and alkaline electrolyzers, including:

- 1) Synthesis, activity and durability of electrolyzer cathode and anode catalysts;

- 2) Durable and functional catalyst supports;
- 3) Approaches for thriving precious metals;
- 4) Novel catalysts including: non-noble metal-based electrocatalysts, high entropy metal alloy/oxides, and single-atom electrocatalysts;
- 5) Computational discovery and design of new electrocatalysts.

Section C: Ionomers, Membranes and Separators for Fuel Cells and Electrolyzers

Organizers: A. Kusoglu, D. Jones, P. Pintauro, M. Hickner, C. Gittleman

Presentations related to ion-exchange ionomers and membranes (PFSA, hydrocarbon-based, etc.) and separators for acidic and alkaline fuel cells and electrolyzers, including:

- 1) Physico-chemical properties of polymer electrolyte membranes and electrode ionomers;
- 2) Structure-property characterization of ionomer dispersions, membranes, and thin films;
- 3) Degradation, aging and stability of membranes and separators (chemical and mechanical);
- 4) Molecular and multi-scale modeling of membrane properties and ionomer interfaces;
- 5) Processing, fabrication, and advanced characterization of ionomers;
- 6) Theory-driven experiment design and data-guided membrane design and development;
- 7) High-temperature polymer membranes (HT-PEM), novel hybrid ionomers, and composite membranes;
- 8) Separators for liquid alkaline electrolyzers.

Section D: Fuel Cell Electrodes, MEAs and Diagnostics

Organizers: E. Kjeang, A. Weber, J. Eller, M. Secanell, S. Jang

Presentations related to the diagnostics, electrochemical and physical characterization and modeling of the complex interplay in acid and alkaline fuel cell catalyst layers, microporous layers, gas diffusion layers and membrane electrode assemblies (MEAs) and their degradation, including:

- 1) Creation of novel materials and structures for high performance, durable fuel cell catalyst layers, microporous layers, gas diffusion layers and MEAs;
- 2) Modeling and diagnostic methods to characterize mass-, charge- and heat-transport-related phenomena, performance degradation, and water management;
- 3) In situ/operando measurement or visualization of electrodes and MEAs (X-ray tomography, neutron imaging, etc.);
- 4) Advanced ex situ characterization methods (TEM, STM, etc.);
- 5) Electrochemical and impedance methods.

Section E: Electrolyzer Electrodes, MEAs and Diagnostics

Organizers: J. Jankovic, W. Mustain, D. Dekel, M. Secanell, Y. Orikasa

Presentations related to the diagnostics, electrochemical and physical characterization and modeling of the complex interplay in acid and alkaline electrolyzer catalyst layers, porous transport layers and membrane electrode assemblies (MEAs) and their degradation, including:

- 1) Creation of novel materials and structures for high performance, durable electrolyzer catalyst layers, porous transport layers and MEAs;
- 2) Modeling and diagnostic methods to characterize mass- and heat- transport related phenomena, performance degradation, and gas/water management;
- 3) In situ/operando measurement or visualization of electrodes and MEAs (X-ray tomography, neutron imaging, etc.);
- 4) Advanced ex situ characterization methods (TEM, STM, etc.);
- 5) Electrochemical and impedance methods.

Section F: Cells, Stacks and Systems for Fuel Cells and Electrolyzers

Organizers: B. Lakshmanan, C. Rice, K. Swider-Lyons, Y. Gonzalez-Garcia, C. Capuano, R. Mantz, H.-I. Joh

Presentations for the design, integration, fabrication, practical operation and durability of integrated acid and alkaline fuel cell and electrolyzer cells, stacks and systems, and their recycling, including:

- 1) Optimization and durability of cell and stack structures and their components, including new types of bipolar plates, porous transport layers, and flow fields;
- 2) Stack and system-level performance and modeling;
- 3) Stack and system-level degradation;
- 4) Balance-of-plant (BOP) components;
- 5) Components and systems for micro fuel cells, direct alcohol fuel cells, and electrochemical compression;
- 6) Advanced cell and stack fabrication methods, such as additive manufacturing or roll-to-roll processes;
- 7) Cell and stack recycling.

Section Z: Plenary session: Invitation-only talks on topics related to the sessions above

Organizer: K. Swider-Lyons

Student Poster Competition

Submitted via sections A, B, C, D, E or F, and then selected for presentation.

Organizer: I. Zenyuk

Abstracts should be submitted electronically to ECS headquarters via the ECS website. Researchers may select between an oral or poster contribution. Space for oral presentations is limited, so research groups that submit several abstracts should seek a reasonable balance between oral and poster contributions. An enhanced edition of *ECS Transactions* is planned and will be available at the meeting. All authors accepted for oral or poster presentations may submit a full-text manuscript for the *ECS Transactions* issue for PEFC&WE24 by July 19, 2024, via an email link provided to authors by ECS.

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Solid State Ionic Devices 15

ECS High-Temperature Energy, Materials, & Processes Division; ECS Battery Division; ECSJ Research Group of Solid State Chemistry; The Korean Electrochemical Society (KECS)

Solid state electrochemical devices, such as batteries, fuel cells, membranes, and sensors, are critical components of technologically advanced societies in the 21st century and beyond. The development of these devices involves common research themes such as ion transport, interfacial phenomena, and device design and performance, regardless of the class of materials or whether the solid state is amorphous or crystalline. The intent of this international symposia series is to provide a forum for recent advances in solid state ion-conducting materials and the design, fabrication, and performance of devices that utilize them. Papers are solicited on all aspects of solid state ionic devices such as solid oxide fuel cells (SOFCs), solid oxide electrolysis cells (SOECs), solid state batteries and microbatteries, chemical sensors, supercapacitors, ion transport membranes, thermal energy converters, and electrochromic devices. Specific topics include device design and performance, modeling and characterization of defect equilibria; ionic and electronic transport; heterogeneous electrocatalysis at electrode surfaces and interfaces; novel synthesis and processing; and materials characterization and structural and crystallographic investigations.

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Seawater Electrodialysis and Electrolysis for Water-Energy Nexus

ECS Industrial Electrochemistry and Electrochemical Engineering Division; ECS Physical and Analytical Electrochemistry Division; The Korean Electrochemical Society (KECS)

Seawater electrolysis is environmentally friendly and is gaining attention as an alternative to traditional ocean energy sources. It can contribute to mitigating problems such as air pollution and ocean acidification. In addition, seawater electrolysis technology can help reduce the cost of hydrogen production. Seawater electrolysis is often preferred over freshwater electrolysis due to resource abundance and sustainability. However, seawater electrolysis requires more energy input than freshwater electrolysis due to the higher concentration of salt in seawater. Additionally, the high salt content of seawater can lead to corrosion and other maintenance issues, which can increase the cost of seawater electrolysis systems. In this regard, an electrodialysis (desalination) process is often combined with seawater electrolysis. Another important application of seawater electrodialysis is in the production of chemicals and other materials. Seawater contains a variety of minerals and ions that can be extracted and used for a range of industrial processes. Electrodialysis can be used to separate these ions and minerals from seawater, allowing them to be used in a cost-effective and environmentally sustainable way.

This symposium focuses on electrochemical ion separation including electro dialysis and capacitive deionization, electrochemical chlorination and aquatic chlorine chemistry, and selective electrolysis (oxygen and hydrogen evolution reactions) of saline water and seawater.

Papers are solicited on the following topics, but are not limited to:

- 1) Synthesis of anodes and cathodes including dimensionally stable electrodes, mixed metal oxides, carbon-based electrodes, boron-doped diamond electrodes;
- 2) Electrochemical ion separation processes of saline water for water-energy nexus;
- 3) Selective oxidation between chloride and water;
- 4) Ammonia synthesis and electrolysis;
- 5) Scaling-free or inhibitive cathodes for hydrogen evolution reaction;
- 6) Electrochemical redox reactions for production of value-added chemicals.

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J—Luminescence and Display Materials, Devices, and Processing

J01

Luminescence and Display Materials: Fundamentals and Applications: In Honor of Baldassare Di Bartolo

ECS Luminescence and Display Materials Division; The Korean Electrochemical Society (KECS)

This is an inter- and cross-disciplinary meeting that brings together high-ranking specialists and young researchers from academia and related industries. Both theoretical and experimental advanced and up-to-date research are presented just to start discussions on the needs and prospects of the novel and emerging research and technologies related to luminescence and display materials. This symposium also encompasses a variety of luminescent phenomena, including photoluminescence, electrochemiluminescence, electroluminescence, and chemiluminescence. An in-depth understanding of the physics behind luminescence processes and methods to design new materials with expected properties is at the core of the presentations and discussions. A 90-minute roundtable discussion is devoted to the subject of what luminescence research can and should offer society.

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K—Organic and Bioelectrochemistry

K01

New Developments in Synthetic Organic Electrochemistry: In Memory of Tatsuya Shono, Tsutomu Nonaka, and Ikuzo Nishiguchi

ECS Organic and Biological Electrochemistry Division; The Electrochemical Society of Japan (ECSJ)

This symposium commemorates Prof. Tatsuya Shono, Prof. Tsutomu Nonaka, and Prof. Ikuzo Nishiguchi who have made significant contributions to this research field. Synthetic organic electrochemistry has been recognized as an important field of study for many years, and recent advances in this field have been rapid and have affected related research areas. In this symposium, we also call for papers on redox chemistry and photochemistry that are related to organic electrochemistry.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

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K02

Pioneering the Future with Bioengineering and Electrochemistry

ECS Organic and Biological Electrochemistry Division; The Korean Electrochemical Society (KECS); The Electrochemical Society of Japan (ECSJ)

This symposium targets bioengineering to be fused with electrochemistry, biological research based on electrochemistry, and future electrochemical applications. Presentations are solicited that describe biodevices including biosensors and bioinspired actuators, biomechanics, biomedical engineering, biomolecular engineering, bioinspired molecular design, and other biosensing technologies. Topics of interest include diagnostic and environmental analyses, therapeutic approaches including theranostics, bioenergy generation, bioremediation, bioconversion, and related topics. Research contributions from both academic and industrial arenas are welcome.

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L—Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry

L01

Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session

ECS Physical and Analytical Electrochemistry Division

In the general session topic areas, all papers concerning any aspect of physical electrochemistry, analytical electrochemistry, electrocatalysis, and photoelectrochemistry, which are not covered by topic areas of other specialized symposia offered at this meeting, are welcome in this symposium. Contributed papers are programmed in some related order, depending on the titles and contents of the submitted abstracts.

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L02

Molten Salts and Ionic Liquids 24 (MSIL-24): In Memory of Yasuhiko Ito

ECS Physical and Analytical Electrochemistry Division; ECS Electrodeposition Division; ECS Energy Technology Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division; ECSJ Molten Salt Committee

This symposium is dedicated to the significant and groundbreaking accomplishments of Yasuhiko Ito (Professor Emeritus, Kyoto University, and former Professor, Doshisha University) in the areas of molten salts and ionic liquids. This symposium provides an international and interdisciplinary forum to present the latest research on systems involving molten salts and ionic liquids. Papers on basic and applied research in all areas of chemistry, engineering, electrochemical systems, and physics related to molten salts and ionic liquids are solicited. We especially encourage former collaborators and students of Prof. Ito to present their current work in these areas. The topics include, but are not restricted to:

- 1) Power and energy applications (e.g., batteries, fuel cells, semiconductors, photovoltaics, and phase change energy storage);
- 2) Rare earth and nuclear chemistry (e.g., lanthanides, actinides, radioisotopes, nuclear reprocessing);
- 3) Electrodeposition (e.g., deposition of alloys, characterization of electroactive species, and surface characterization);
- 4) Reactions (e.g., catalysis, synthesis, oligomerizations, and polymerizations);
- 5) Separations (e.g., selective extractions and biphasic systems);
- 6) Solute and solvent properties (e.g., structural investigations, thermal properties, dynamics, and stability of ionic liquids and molten salts);
- 7) Biomass applications (e.g., dissolution, modification, and/or reactions utilizing biomass),
- 8) Materials (e.g., polymer blends, additive manufacturing, active coatings, and corrosion studies);

- 9) New ionic liquids and molten salt mixtures (e.g., liquid clathrates, binary and ternary melts, and task specific ionic liquids);
- 10) Deep eutectic solvents (e.g., synthesis, properties, and applications).

In addition, paper submission is encouraged for a special session honoring Prof. Douglas R. MacFarlane, recipient of the 2024 Physical and Analytical Electrochemistry Division Max Bredig Award in Molten Salt and Ionic Liquid Chemistry.

Keynote lectures are presented by invited speakers. A poster session is planned. Student participation is highly encouraged, and it is anticipated that some funds will be available to support students and young scientists.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

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L03

Electrode Processes 15

ECS Physical and Analytical Electrochemistry Division; ECS Energy Technology Division

This symposium provides an international and interdisciplinary forum on the fundamental and applied aspects of electrode processes. Topics of interest include novel electrode processes that may lead to new technologies or unique materials; well-ordered systems (structure, adsorbates, and deposits on single-crystal surfaces); properties of electrodeposits, nanometer-scale structures, theory, modeling; dynamics, thermodynamics, heterogeneous reactions, e.g., inorganic and organic electrocatalysis; industrial processes, fuel cells, and batteries. The symposium includes both invited and contributed papers on all facets of the chemistry, physics, physical chemistry, and electrochemistry of electrode processes.

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L04

Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 14

ECS Energy Technology Division; ECS Physical and Analytical Electrochemistry Division; ECS Sensor Division; The Korean Electrochemical Society (KECS)

This symposium provides an international and interdisciplinary forum to present the latest research on photocatalysts, photoelectrochemical cells and solar fuels. Topics of interest include, but are not limited to:

- 1) Photocatalysts or photoelectrochemical cells;
- 2) Synthesis and characterization of solar energy materials;
- 3) Plasmonic nanostructures for solar energy devices;
- 4) Solar thermal panels and solar reactors;

- 5) Structures and devices for water splitting;
- 6) Electrocatalysts for hydrogen evolution reaction (HER), oxygen evolution reaction (OER), carbon dioxide reduction and nitrogen fixation;
- 7) Capture or conversion of carbon dioxide to fuels;
- 8) Conversion of renewable energy resources to fuels (hydrogen, ethanol, methanol, ammonia and other fuels);
- 9) Photocatalytic disinfection and environmental remediation;
- 10) Fundamental studies on charge dynamics or surface reactions in semiconductors or molecules using modern analytical techniques such as X-ray and ultrafast laser spectroscopy;
- 11) Simulation and modeling of materials, interfaces, devices and systems for solar energy applications;
- 12) Corrosion and durability of solar energy materials and devices.

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L05

Advanced Techniques for In Situ Electrochemical Systems 7

ECS Physical and Analytical Electrochemistry Division; ECS Energy Technology Division; The Korean Electrochemical Society (KECS)

In situ methods help advance understanding of electrochemical systems developed to solve the energy, environmental, and biological needs of society. This symposium provides a forum targeting advancements and applications of various methods for in situ and operando characterization of electrochemical systems. Solicited topics include, but are not limited to various electroanalytical methods and in situ spectroscopy, spectrometry, and microscopy techniques. The symposium covers a broad range of electrochemical systems, including fundamental electrochemical analysis, bio/molecular electrochemistry, photoelectrochemistry, sensors, electrocatalysis, capacitors, batteries, fuel cells, ionic conductors, and more. Of special interest are papers focused on synchrotron-based techniques for characterization of electroactive materials, electrode-electrolyte interfaces, and electrochemical devices.

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L06

Electrocatalysis at the Interface: From Fundamental Studies to Applications

ECS Physical and Analytical Electrochemistry Division; The Korean Electrochemical Society (KECS)

Electrocatalysis has over the last years transformed our energy landscape from a carbon-based to a sustainable society. Unfortunately, until today, electrochemical energy devices suffer from performance or selectivity issues which have been increasingly approached from a material and engineering perspective. At the same time, an increasing number of studies have reported the importance of tuning the chemical and physical characteristics of electrode-electrolyte interfaces. These are characterized by the formation of an electric double layer (EDL) at which all electrochemical processes take place. Our increased understanding about the EDL has led to macroscopic cell design concepts, such as the use of ionomers to increase the density of cations close to the electrode. Despite the significance of the EDL, many questions remain, as our knowledge in large part remains based on models with unverified assumptions. In addition, electrochemical reactions under confinement in nano-sized dimensions and their physicochemical characteristics are extensively studied due to their potential importance for various electrochemical energy systems.

The objective of this symposium is to bring together scientists and engineers whose goal is to increase our fundamental knowledge of the EDL and electrochemical reactivity under nano-confined conditions which link to electrocatalytic performance (activity/selectivity/stability) using state-of-the-art experimental and computational techniques. This symposium is seen as a platform for deep discussion of the connection between fundamental understanding and application in real systems. This comprises, for example, the effect of cations, anions, water structure, hydrodynamic and nanoscale phenomena, or design principles of electrocatalysis and its interface based on activity, stability, and selectivity. The organizers invite contributions on, but not limited to the following topics:

- Fundamental understanding of the EDL and its functional link to electrocatalysis, as well as the coupling of its structure to the kinetics of electrochemical processes via both experiments and simulations;
- Computational simulations of interest include continuum as well as explicit atomistic representations of the electrolyte. Recently, fully atomistic descriptions of the electrolyte have become increasingly feasible and of particular interest. Force-field based descriptions are interesting as well as the application of cutting-edge machine learning tools;
- Advanced characterization techniques that shed new light on the interfacial chemistry and structures, with emphasis placed on new in situ/operando tools, probes and methods aiming to measure the dynamic processes at the electrochemical interfaces;
- Fundamental understanding of electrochemistry under the nanoconfinement via both experiments and simulations.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Chang Hyuck Choi**, Pohang University of Science and Technology, chchoi@postech.ac.kr; **Hyungjun Kim**, Korea Advanced Institute of Science and Technology, linus16@kaist.ac.kr; **Yingjie Zhang**, University of Illinois at Urbana-Champaign, yjz@illinois.edu; **Stefan Ringe**, Korea University, sringe@korea.ac.kr; **Dong Young Chung**, Korea Advanced Institute of Science and Technology, dychung@kaist.ac.kr; **Jinho Chang**, Hanyang university, jhcechem@hanyang.ac.kr; **Hyun Seo Ahn**, Yonsei University, ahnhs@yonsei.ac.kr.

Fundamentals of Carbon Dioxide Reduction

ECS Physical and Analytical Electrochemistry Division; ECS Energy Technology Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division; ECS Organic and Biological Electrochemistry Division

There has been growing interest in the electrocatalytic, bioelectrochemical and photoelectrochemical conversion of carbon dioxide (CO₂), a potent greenhouse gas and contributor to global climate change, into useful carbon-based fuels or chemicals. The reaction products are of potential importance to energy technology, food research, medical applications, and fabrication of plastic materials. This symposium provides an interdisciplinary forum to present the latest research on the electrochemical, bioelectrochemical and photoelectrochemical reduction of CO₂. Topics of interest include, but are not limited to:

- 1) Mechanistic aspects of electroreduction of carbon dioxide;
- 2) Novel methods for the production of small organic molecules (C1-C4) and other chemicals;
- 3) Synthesis and characterization of highly selective and durable electrode materials and semiconductor photoelectrode materials;
- 4) Importance of the reaction conditions including choice of supporting electrolyte;
- 5) Ideas on the latest developments in electrode construction in a full single-cell as well as stack configuration;
- 6) Electrocatalysts for CO₂ reduction and H₂O oxidation/reduction;
- 7) In situ/operando study for electrochemical reactions.

Special attention is paid to the development of homogeneous and heterogeneous systems, including supramolecular assemblies and novel electrolytes (e.g., ionic liquids), that are proposed to induce CO₂ conversion. The symposium includes both invited and contributed papers on all aspects of the electrochemical and photoelectrochemical conversion of CO₂.

This symposium is not publishing an issue of *ECS Transactions*. ECS encourages presenters to submit to the ECS family of journals as an alternate publishing opportunity. Learn more at <https://www.electrochem.org/publications>.

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M—Sensors

Recent Advances in Sensors Systems: General Session

ECS Sensor Division; The Electrochemical Society of Japan (ECSJ); The Korean Electrochemical Society (KECS)

This general session symposium welcomes papers on all aspects of sensor research and development not covered in other symposia. This symposium provides a forum for the broad discussion of interdisciplinary topics including molecular recognition surfaces, transduction methods, integrated/microsensor systems, and its application in unique environments. Topics of interest include, but are not limited to:

- 1) Development of new selective molecular recognition surface, scaffold, and materials;
- 2) Novel methods for signal amplification and detection;
- 3) Physics and chemistry of sensors and sensor materials, synthesis/fabrication and characterization of novel compositions;
- 4) Novel sensor concepts, design, modeling, architectures, and verification, including pre-concentration and separation;
- 5) Physical, chemical, and biological/biomedical sensors and actuators, their system integration, and actuating functions;

- 6) Optical and photonic sensing;
- 7) Sensor arrays (e.g., electronic noses and tongues) for the simultaneous detection of multiple analytes;
- 8) Micro total analysis systems (μ -TAS);
- 9) Internet of Things (IoT) and wireless sensors;
- 10) Emerging technologies and applications including quantum/nanosensors and sensors leveraging quantum/nano-technology;
- 11) Computational modeling and data analytics (e.g., machine learning and artificial intelligence) of sensors;
- 12) Sensor and analytical systems for safety, security, and harsh environments.

All transduction methods are of interest for this symposium (e.g., electrochemical, electromagnetic, optical, acoustic, gravimetric, and thermal). The goal of this symposium is to present the broadest possible coverage of modern physical, chemical, and biological sensing progress and to highlight the present state of the art relative to basic and applied areas.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Thomas G. Thundat**, University at Buffalo, tgthunda@buffalo.edu; **Jessica Koehne**, NASA Ames Research Center, jessica.e.koehne@nasa.gov; **Larry A. Nagahara**, Johns Hopkins University, larry.nagahara@jhu.edu; **Dong Joo Kim**, Auburn University, dkim@auburn.edu; **Leyla Soleymani**, McMaster University, soleym1@mcmaster.ca; **Aida Ebrahimi**, Pennsylvania State University, sue66@psu.edu; **Lok-kun Tsui**, University of New Mexico, lktsui@unm.edu; **Peter Hesketh**, Georgia Institute of Technology, peter.hesketh@me.gatech.edu; **Dongmei Dong**, Florida International University, ddong@fiu.edu; **Takeo Hyodo**, Nagasaki University, hyodo@nagasaki-u.ac.jp.

Chemical Sensors 14

ECS Sensor Division; The Electrochemical Society of Japan (ECSJ)

This symposium provides a forum for the broad discussion of research and development in the field of chemical sensors (gas, liquid, and other types), including molecular recognition surfaces, transduction methods and integrated and microsensor systems. Topics of interest include, but are not limited to:

- Development of new selective molecular recognition surface and materials;
- Quantum sensors;
- Smart sensors for industry 4.0 and agriculture;
- Sensor and analytical systems for safety and security;
- AI-enabled sensors;
- Integrated sensor systems;
- Novel methods for signal amplification and detection;
- Sensor arrays for the simultaneous detection of multiple analytes;
- Physics and chemistry of sensors and sensor materials, synthesis/fabrication and characterization of novel compositions;
- Novel sensor concepts, design, modeling, verification and field testing;
- Sensor arrays, and electronic noses and tongues;
- Physical, chemical and biological/biomedical sensors and actuators, such as gas;
- Humidity, ion, and molecular sensors, their system integration and actuating functions;
- Optical sensors and fiber optic sensors;
- Wireless sensors;
- Harsh environment sensors;
- Low-cost sensors;
- Wearable and flexible sensors;
- Sensor arrays.

All transduction methods are of interest for this symposium (e.g., electrochemical, resistive, capacitive, optical, acoustic, gravimetric and thermal). The goal of this symposium is to present the broadest possible coverage of modern chemical sensing progress and to highlight the present

state of the art relative to basic and applied areas. Prospective authors are encouraged to submit their extended work to *ECS Transactions*, *ECS Sensors Plus*, *ECS Advances*, and *Journal of The Electrochemical Society*.

This symposium's proceedings will be published in *ECS Transactions* and available at the meeting. Authors accepted for presentation are strongly encouraged to submit their full-text manuscript for the issue no later than August 9, 2024. Submit all manuscripts online in either MS Word or PDF format.

Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Praveen Kumar Sekhar**, Washington State University Vancouver, praveen.sekhar@wsu.edu; **Jessica Koehne**, NASA Ames Research Center, jessica.e.koehne@nasa.gov; **Thiagarajan Soundappan**, Navajo Technical University, tsoundappan@navajotech.edu; **Larry A. Nagahara**, Johns Hopkins University, larry.nagahara@jhu.edu; **Tomoyuki Yasukawa**, University of Hyogo, yasu@sci.u-hyogo.ac.jp; **Masanobu Matsuguchi**, Ehime University, matsuguchi.masanobu.mm@ehime-u.ac.jp; **Tsuyoshi Tanaka**, Tokyo University of Agriculture and Technology, tsuyo@cc.tuat.ac.jp; **Shinji Tamura**, Osaka University, shinji@chem.eng.osaka-u.ac.jp; **Takeo Hyodo**, Nagasaki University, hyodo@nagasaki-u.ac.jp; **Vinoth Kumar Ponnusamy**, Kaohsiung Medical University, kumar@kmu.edu.tw; **Lok-kun Tsui**, University of New Mexico, lktsui@unm.edu; **Rangachary Mukundan**, Lawrence Berkeley National Laboratory, rmukundan@lbl.gov.

- 1) Photoelectrochemistry;
- 2) Photo/electro-functional materials (e.g., photo/electrochromism);
- 3) Semiconductor electrochemistry including diamond electrochemistry;
- 4) TiO₂ photocatalysis;
- 5) Applications in air/water purification, antibacterial/sterilization, antifouling/defogging, energy conversion, and sensor technology.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers:

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Z—General

Z01

General Student Poster Session

The Electrochemical Society (ECS); The Electrochemical Society of Japan (ECSJ); The Korean Electrochemical Society (KECS)

This poster session provides a forum for graduate and undergraduate students to present research results of general interest to ECS, ECSJ, and KECS. The session's purpose is to foster and promote work in both electrochemical and solid state science and technology, and to stimulate active student interest and participation in ECS, ECSJ, and KECS. Posters accepted for presentation in this session are eligible for General Student Poster Awards. To be considered for awards, student poster authors must (1) upload a digital poster, and (2) be present during the in-person judging session. The top three student authors receive prizes: 1st place: \$1,500; 2nd place: \$1000; and 3^d place: \$500.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Alice Suroviec**, Berry College, asuroviec@berry.edu; **Naoaki Yabuuchi**, Yokohama National University, yabuuchi-naoaki-pw@ynu.ac.jp.

Z02

A Lifetime of Cleaning the Planet: In Honor of Akira Fujishima

ECS Sensor Division; Battery Division; ECS Physical and Analytical Electrochemistry Division; The Electrochemical Society of Japan (ECSJ); The Korean Electrochemical Society (KECS)

This symposium honors Prof. Akira Fujishima for his outstanding contributions to a host of PRiME topics related to clean environmental science and technology. Best known for his discovery with Prof. Kenichi Honda in 1972 of the water photolysis process using titanium dioxide (TiO₂) and ultraviolet light. Over his 50+ year career, Prof. Fujishima has been a polymath in both fundamental and applied research.

This symposium focuses on all aspects of clean environmental science and technology topics related to Prof. Fujishima's research career that include, but are not limited to:

Z03

Innovation in Electrochemistry

ECS Physical and Analytical Electrochemistry Division; ECS Energy Technology Division; ECS Industrial Electrochemistry and Electrochemical Engineering Division; The Korean Electrochemical Society (KECS)

"Innovation: The introduction of something new" (Merriam-Webster)

This symposium encompasses all that is newly introduced to electrochemistry and electrochemical engineering, from the technological to methodologies, to the fundamental. Of interest are innovations in technologies for energy, materials, water, devices, and processes; methodologies in environmental remediation, sensors, synthesis, measurements, mechanistic discrimination, separations, medicine, and education; and fundamentals of materials, properties, mass transport, electron transfer, reaction processes, and electrocatalysis. Interests include thermodynamics and dynamic energies across the scale of electrochemical systems from phenomena in extended phases to the stochastic collisions of single entities. The juxtaposition of patents and publications and the protection of intellectual property are of interest. Papers that discuss the unique, inherent advantages and limitations of electrochemical approaches are welcome. Each presenter is asked to briefly describe the prospective impact of their electrochemical innovation.

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Submit abstracts electronically to ECS headquarters. Email questions and inquiries to the symposium organizers: **Johna Leddy**, University of Iowa, johna-leddy@uiowa.edu; **Trung Nguyen**, University of Kansas, cptvn@ku.edu; **Jun Hui Park**, Chungbuk National University, jhp@chungbuk.ac.kr; **E. Jennings (EJ) Taylor**, Faraday Strategies LLC, ejenningtaylor@gmail.com; **Byung-Kwon Kim**, Ewha Womans University, kimb@ewha.ac.kr; **Andrew Herring**, Colorado School of Mines, aherring@mines.edu; **Jin Soo Park**, Sangmyung University, energy@smu.ac.kr; **Sang Hoon Kim**, Korea Institute of Science and Technology, kim_sh@kist.re.kr; **Sunghyun Uhm**, Institute for Advanced Engineering, electrik@iae.re.kr; **K. Andreas Friedrich**-Universität Stuttgart, andreas.friedrich@dlr.de; **Mitsuru Higa**, Yamaguchi University, mhiga@yamaguchi-u.ac.jp; **Damilola A. Daramola**, Ohio University, daramola@ohio.edu; **Paul J. A. Kenis**, University of Illinois at Urbana-Champaign, kenis@illinois.edu; **Sunghyun Uhm**, Institute for Advanced Engineering, electrik@iae.re.kr; **Andrew Herring**, Colorado School of Mines, aherring@mines.edu.