

INTERNATIONAL INSTITUTE FOR CARBON-NEUTRAL ENERGY RESEARCH

2025 WPI SYMPOSIUM IN MADRID

“ENERGY MATERIALS FOR A SUSTAINABLE FUTURE”

INSTITUTE OF CERAMICS AND GLASS, SPANISH NATIONAL RESEARCH COUNCIL & ONLINE

SYMPOSIUM DAY 1: TUESDAY, NOVEMBER 11TH, 2025

Opening Remarks (Chair: Masanobu Kubota, I²CNER, Kyushu University)

- 11:00 a.m. Opening Remarks & Introduction to CSIC
Jose Angel Martin Gago, *Director, ICMM-CSIC*
Ainara Aguadero, *Tenured Scientist, ICMM-CSIC*
- 11:20 a.m. Opening Remarks
Tatsumi Ishihara, *Director, I²CNER, Kyushu University*
Tatsuro Ishibashi, *President, Kyushu University* *pre-recorded
Kazunari Domen, *WPI Academy Officer* *online
- 11:35 a.m. Introduction to Kyushu University
Konomi Natalie, *Vice President for International Affairs and Diversity, Kyushu University* *online
- 11:50 a.m. Introduction to I²CNER
Tatsumi Ishihara, *Director, I²CNER, Kyushu University*
- 12:05 p.m. ***Photo Session***
- 12:15 p.m. ***Lunch***

Invited Lectures (Chair: Toshinori Matsushima, I²CNER, Kyushu University)

- 1:30 p.m. Invited Lecture 1
“Next Generation of Solid State Ionic Electrochemical Systems”
Ainara Aguadero, *Tenured Scientist, CSIC*
- 2:15 p.m. Invited Lecture 2
“Steam Electrolysis for Energy-Efficient Hydrogen Production”
Hiroshige Matsumoto, *Associate Director, I²CNER, Kyushu University*
- 3:00 p.m. Invited Lecture 3
“2D materials and devices for energy management and storage”
Miguel Muñoz Rojo, *Tenured Scientist, CSIC*

3:45 p.m. Invited Lecture 4
"Creep Properties in Hydrogen for High-Temperature Applications"
Masanobu Kubota, Professor, I²CNER, Kyushu University

4:30 p.m. **Coffee Break**

Session I (Chair: Aleksandar Staykov, I²CNER, Kyushu University)

5:00 p.m. Lecture I-A
"Improved Components for Proton Exchange Membrane Water Electrolyzers"
Maria Retuerto, Tenured Scientist, CSIC
Carlos Prieto, Professor of Research, CSIC

5:25 p.m. Lecture I-B
"Grain Boundaries in MIECs, Buffers (Topes) or Shinkansen (AVEs)"
John A. Kilner, Professor, Imperial College London

5:50 p.m. Lecture I-C
"Advancing Perovskite Optoelectronics through Nanophotonics and Integrated Device Design"
Sol Carretero, Tenured Scientist, CSIC

6:15 p.m. Lecture I-D
"High-Efficiency and Durable Perovskite Solar Cells Employing Functional Organic Materials"
Toshinori Matsushima, Associate Professor, I²CNER, Kyushu University

8:30 p.m. Conference Dinner
**Limited space available*

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SYMPOSIUM DAY 2: WEDNESDAY, NOVEMBER 12TH, 2025

Session II (Chair: Jose Antonio Alonso, CSIC)

9:00 a.m. Lecture II-A

“Insights into Charge Dynamics and Stability of Non-Fullerene Acceptors and Redoxmers for Organic Photovoltaics and Energy Storage”

Mohammad Uddin, Ramon y Cajal Fellow, CSIC

9:25 a.m. Lecture II-B

“Thin Film Batteries Prepared by PVD Methods”

Thomas Lippert, Professor, Paul Scherrer Institut

9:50 a.m. Lecture II-C

“Composition engineering of thermoelectric materials”

Federico Serrano, Ramon y Cajal Fellow, CSIC

10:15 a.m. Lecture II-D

“Discovery of Novel Superionic Conductors and their Structural Origins”

Masatomo Yashima, Professor, Institute of Science Tokyo

10:40 a.m. Lecture II-E

“Mechanochemical Synthesis, Crystal Structure and Ionic Transport in Sustainable Halide-Based Solid Electrolytes”

Henrik L. Andersen, Ramon y Cajal Fellow, CSIC

11:05 a.m. **Coffee Break**

Session III (Chair: Ricardo Jimenez, CSIC)

11:25 a.m. Lecture III-A

“Ionic Conductivity and Stability of Reduced Niobate-Tungstates”

Stephen Skinner, Professor, Imperial College London

11:50 a.m. Lecture III-B

“Comparative Study of Modified LiTa₂PO₈ Ceramics”

Isabel Sobrados, Senior Scientist, CSIC

12:15 p.m. Lecture III-C

"Preparation and Proton Conductivity of Inorganic Nanosheet-Based Electrolytes"
Shintaro Ida, Professor, Kumamoto University

12:40 p.m. Lecture III-D

"Supramolecular Chemistry and Chirality in Energy Technologies"
Amparo Ruiz-Carretero, Assistant Professor, ICS-CNRS & Visiting Scientist, CSIC

1:05 p.m. Lecture III-E

"Carbon Nitride Based Materials for Photocatalytic Hydrogen Peroxide Reaction"
Motonori Watanabe, Associate Professor, I²CNER, Kyushu University

1:30 p.m. Presentation by Japan Society for the Promotion of Science (JSPS)

"Information about the 'Research Fellowships' and 'Overseas Challenge Programs' for Young Researchers"
Natsuki Shoda, Deputy Director, JSPS Strasbourg Office

1:50 p.m. **Lunch + Poster Session 1**

"Effect of Hydrogen on Creep Deformation of Pure Iron"
Kentaro Wada, D2 Student, Kyushu University

"Low-Temperature Steam Electrolysis using Proton-Conducting Silicate Nanosheet Membrane"
Kazuto Hatakeyama, Assistant Professor, Kumamoto University

"Electrolyte Thinning and Interface Engineering for High-Performance Proton Exchange Membrane Fuel Cell"
Tatsuki Tsugawa, D3 student, Kumamoto University

"Development of Fuel Cell with Proton Conducting Silicate Nanosheets"
Kanako Oka, M2 student, Kumamoto University

"Preparation of Ce(IV) Intercalated Montmorillonite Nanosheet for Proton Conductivity Enhancement"
Benyapa Yawanopas, M1 student, Kumamoto University

"Strain Effect of OH⁻ Conductivity in Hydroxide Nanosheets Membrane"
Kaito Takegami, M1 student, Kumamoto University

"High In-Plane Proton Conductivity through 2D Nanochannels in Free-Standing HNb₃O₈ Nanosheet Membrane"
Asahi Yuji, M1 student, Kumamoto University

"Flexible Fuel Power Generation via Proton-Conducting Membrane Reactors"
Wendelin Deibert, Senior Researcher, Forschungszentrum Jülich GmbH

"Significant Cryo-Magnetocaloric Effect in the Pyrochlore Gd₂CrSbO₇ with Ferrimagnetic Ordering from 3d-4f Exchange Interactions"
Romualdo Silva, Juan de la Cierva Fellow, CSIC

"High-Voltage Operation of Aqueous Flexible Supercapacitors via Controlled Desolvation of Hydrogel Electrolytes"

Manuel Cerro, PhD student, CSIC

"Codoping Synergy as an Anode Optimization Strategy for Solid Oxide Fuel Cells"

Lucia Sanchez de Bustamante, PhD student, CSIC

"Local Electrochemical Properties of Epitaxial LiCoO₂ Cathodes"

Gabriel Eduardo Almanza-Vergara, PhD student, CSIC

"Enabling Anode-Free Solid State Sodium Batteries through Surface-Decorated NaSICON Interfaces"

Cristina Garcia Torrejon, PhD student, CSIC

"Halide Mixing as a Pathway to Enhance Ionic Conductivity in Solid-State Electrolytes"

Jazmin M. Mayta, PhD student, CSIC

"From Structure to Performance: Ru-Doped SrMoO_{3-d} as High-Efficiency IT-SOFC Anodes"

Monica Chivite-Lacaba, PhD student, CSIC

"High Performance OER Catalysts Derived from Eutectic Leachates of Spent Lithium-Ion Batteries"

Paula Garcia, CSIC

Session IV (Chair: Lourdes Calzada, CSIC)

3:10 p.m. Lecture IV-A

"3D Printing of Piezoelectric Hybrid Biocomposites for Autonomous Smart Systems"

Cristina Pascual, Ramon y Cajal Fellow, CSIC

3:35 p.m. Lecture IV-B

"Manufacturing and characterisation of layered ceramic systems for energy applications"

Wilhelm A. Meulenber, Professor, Forschungszentrum Jülich GmbH

4:00 p.m. Lecture IV-C

"Thin Film Architectures Integrating Photo-Ferroelectric Metal Oxides for Multisource Energy Harvesting"

Miguel Alguero, Senior Researcher, CSIC

4:25 p.m. Lecture IV-D

"First-Principle Simulations for Design of Energy Related Materials"

Aleksandar Staykov, Associate Professor, I²CNER, Kyushu University

4:50 p.m. Lecture IV-E

"Sustainable Polymer Composites for Triboelectric Nanoenergy Harvesting"

Bernd Wicklein, Tenured Scientist, CSIC

5:15 p.m. Lecture IV-F
"Materials Development for Realizing the 300°C-Operable Ceramics Fuel Cells"
Junji Hyodo, Associate Professor, I²CNER, Kyushu University

Social Activity

5:40 p.m. Laboratory Tour
Visit to the Laboratories of the Institute of Materials Science of Madrid, CSIC
**Limited space available*

7:00 p.m. End of Symposium Day 2

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SYMPOSIUM DAY 3: THURSDAY, NOVEMBER 13TH, 2025

Session V (Chair: Motonori Watanabe, I²CNER, Kyushu University)

9:00 a.m. Lecture V-A

“Transforming Energy Materials Discovery with Artificial Intelligence and Advanced Characterization Tools”

Maria Carmen Asensio, Professor, CSIC

9:25 a.m. Lecture V-B

“Electrification or Hydrogen? Strategic Pathways to Japan’s 2050 Carbon Neutrality”

Shamal Chandra Karmaker, Assistant Professor, I²CNER, Kyushu University

9:50 a.m. Lecture V-C

“Pulsed Laser Deposition of LFP/LCO Blending Cathodes for ‘Zero-Strain’ Solid State Li-Ion Batteries”

Arturo Galindo Sanz, PhD student, CSIC

10:15 a.m. Lecture V-D

“Emerging Strategies for High-Entropy Photocatalysts in Solar-Driven Reactions”

Saeid Akrami, Assistant Professor, I²CNER, Kyushu University

10:40 a.m. Closing Remarks

John A. Kilner, Imperial College London

Ainara Aguadero, ICMM-CSIC

Hiroshige Matsumoto, I²CNER, Kyushu University

10:50 a.m. **Coffee Break + Poster Session 2**

“Efficient Production of Hydrogen from Water Decomposition Using Iodine Redox Species”

Mai Tomisaki, Assistant Professor, I²CNER

“Machine Learning-Based Model of Natural Soil CO₂ Flux to Support Leakage Monitoring in Carbon Capture and Storage Systems”

Nguyen Linh Thi Hoai, Assistant Professor, I²CNER

"Dopant-Effects of CuFe₂O₄ mixed with La(Sr)Fe(Mn)O₃ for High-Performance Solid Oxide CO₂-H₂O Electrolysis Cells"

Jiwoo Park, D2 student, Kyushu University

"Properties of SiC Thin Films for Photoelectrode Applications to CO₂ Reduction"

Yoshiki Fujimoto, M1 student, Kyushu University

"Autonomous Data-Driven Discovery of Proton-Conducting Oxide"

Jiarui Song, M1 student, Kyushu University

"Proton conduction in novel donor-doped perovskites"

Ryo Maeda, M2 student, Institute of Science Tokyo

"High Oxide Ion Conduction in Palmierites via Oxygen Vacancies and Rb Cation"

Bowen Yao, M2 student, Institute of Science Tokyo

"Ultrafast Oxide-Ion Conduction in Sillén Oxyhalides"

Hidetoshi Udagawa, M1 student, Institute of Science Tokyo

"Influence of Ion-Exchange Membranes and Controlled Iron Coordination on the Performance of All-Iron Flow Batteries"

Wenjia Zgang, PhD student, CSIC

"Functional Optimization of NCO and NASICON Synthesis by Physical Vapor Deposition"

Andrea Marchetti, PhD student, CSIC

"Gel-Glass Liquid Crystals Energy Materials"

Yaiza Lozano, PhD student, CSIC

"Understanding Structure and Dynamics in Stable Aqueous Electrolytes: a Computational Study of Water/reline Mixtures"

Juan Morales, PhD student, CSIC

"Influence of Binder on the Aqueous Processing of Composite Ni-Rich Cathodes for High-Energy Sustainable Li-Ion Batteries"

Jose Manuel Amarilla & Maria Eugenia Davila, Tenured Scientists, CSIC

"Anomalous Nerst Effect on Magnetic Multilayers with Perpendicular Magnetic Anisotropy"

Pablo Martinez, PhD student, CSIC

12:00 p.m. End of Symposium