

Program

Mixed Conducting and Nonstoichiometric Compounds VIII

November 3 - 7, 2024

Tainan, Taiwan

Conference Chairs

William C. Chueh
Stanford University, USA

Kuan-Zong Fung
National Cheng Kung University, Taiwan

Hitoshi Takamura
Tohoku University, Japan



Engineering
Conferences
International

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National Cheng Kung University
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Kuang-Fu Campus

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Nonstoichiometric Compounds Conferences History

An ECI Conference Series

Nonstoichiometric Ceramics and Intermetallics (1998)
Jules Routbort, Rudiger Dieckmann, and Thomas Mason
Kona, Hawaii

Nonstoichiometric Ceramics and Intermetallics II (2001)
Rudiger Dieckmann and C.T. Liu
Barga, Italy

Nonstoichiometric Compounds III (2005)
Manfred Martin, Thomas O. Mason, and Junichiro Mizusaki
Kauai, Hawaii

Nonstoichiometric Compounds IV (2009)
Han-Il Yoo, Shu Yamaguchi, Juergen Janek, and Sossina M. Haile
Jeju Island, Korea

Nonstoichiometric Compounds V (2012)
Juergen Janek, Lorenzo Malavasi, Tatsuya Kawada, and Ryan O'Hayre
Sicily, Italy

Nonstoichiometric Compounds VI (2016)
Ryan O'Hayre, Juergen Janek, Yoshihiro Yamazaki
Santa Fe, New Mexico, USA

Nonstoichiometric Compounds VII (2019)
Hitoshi Takamura, Roger De Souza, Ryan O'Hayre
Miyazaki (Kyushu Island), Japan

Conference Sponsor

**National Cheng Kung University,
Hierarchical Green-Energy Materials Research Center
(Hi-GEM)**

Sunday, November 3, 2024

17:00 – 19:00	Conference Check-in (Shangri La Hotel – B2 Foyer)
18:00 – 19:00	Reception (Welcome drink and hors d'oeuvres) (B2 – Foyer)
19:00 – 21:00	Dinner (B2 Fu Chen & An Ping function rooms)

Locations and Notes

- **Conference check-in will be held in the B2 Foyer at the Shangri-La Far Eastern Hotel.**
- **Technical sessions will be held at the National Cheng Kung University (NCKU), Kuang-Fu Campus, International Conference Hall, 1st Lecture Room**
- *ECI staff will be on site in a marked classroom.*
- *Coffee Breaks and Lunches will be held in the Multifunction Room (1F).*
- *The Poster Session will also be held in the Multifunction Room (1F).*
- *Dinner locations are noted in the program.*
- *Transportation to the Night Market dinner on Tuesday will be provided by bus from the Shangri-La Far Eastern Hotel.*
- *The banquet dinner on Wednesday will be held at the Grand Banyan Hotel. Transportation will be provided by bus from NCKU.*
- *Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile telephones to vibrate or off during technical sessions.*
- *After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.*
- *Emergency Contact Information: Because of privacy concerns, ECI does not collect or maintain emergency contact information for conference participants. If you would like to have this information available in case of emergency, please use the reverse side of your name badge.*

****All talks are scheduled for 40 min to accommodate 30 min presentations and 10 min Q&A**

Monday, November 4, 2024

08:45 – 09:00

Welcome Remarks

William Chueh, Stanford University, USA
Kuan-Zong Fung, National Cheng Kung University, Taiwan
Hitoshi Takamura, Tohoku University, Japan
Manfred Martin, RWTH Aachen University, Germany

Session 1

Chair: **Yue Qi**, Brown University, USA

09:00 – 09:40

Transient state methods to determine all the mass/charge transport properties of a mixed conducting compound

Han-Il Yoo, Seoul National University, South Korea

09:40 – 10:20

Diffusion and conduction over two sites with inherent partial occupancy

Truls Norby, University of Oslo, Norway

10:20 – 11:00

Controlling anion nonstoichiometry in mixed anion compounds

Hiroshi Kageyama, Kyoto University, Japan

11:00 – 11:20

Coffee Break

11:20 – 12:00

Dry and *operando* structural characterization of organic mixed conductors

Alberto Salleo, Stanford University, USA

12:00 – 12:40

Effects of electrolyte composition on the electrochemistry of organic mixed conducting polymers

Ana de la Fuente Duran, Stanford University, USA

12:40 – 13:40

Lunch

Session 2

Chair: **Hiroshi Kageyama**, Kyoto University, Japan

13:40 – 14:20

Revisiting the electrode polarization modeling on solid oxide electrolytes

Tatsuya Kawada, Tohoku University, Japan

14:20 – 15:00

Defect complex induced electrostriction in doped ceria: origin and implications

Yue Qi, Brown University, USA

15:00 – 15:40

Atomistic insight into low-temperature cation ordering of Fe-added ceria-zirconia-based oxides

Hitoshi Takamura, Tohoku University, Japan

15:40 – 16:00

Coffee Break

16:00 – 16:40

Effect of dopants on the local distortion and its relaxation in CeO₂ matrix

Shu Yamaguchi, National Institution for Academic Degrees, Japan

**All talks are scheduled for 40 min to accommodate 30 min presentations and 10 min Q&A

Monday, November 4, 2024 (continued)

- | | |
|---------------|---|
| 16:40 – 17:20 | Insights into oxygen ion transport kinetics using isotope exchange Raman spectroscopy
Mónica Burriel, Université Grenoble Alpes, France |
| 17:20 – 18:00 | Surface modification of perovskite electrodes for solid oxide cells
Pei-Chen Su, Nanyang Technological University, Singapore |
| 18:00 – 19:00 | Poster session |
| 19:00 – 21:00 | Dinner (Multifunction Room (1F) at NCKU) |

**All talks are scheduled for 40 min to accommodate 30 min presentations and 10 min Q&A

Tuesday, November 5, 2024

Session 3

Chairs: **Paul McIntyre**, Stanford University, USA

09:00 – 09:40 **Memristive devices: from materials science to neuromorphic computing**
Qiangfei Xia, University of Massachusetts Amherst, USA

09:40 – 10:20 **Computing with drift and diffusive memristors**
J. Joshua Yang, University of Southern California, USA

10:20 – 11:00 **From nanoionic effects in valence change memories to neuromorphic computing**
Regina Dittmann, Forschungszentrum Juelich, Germany

11:00 – 11:20 Coffee Break

11:20 – 12:00 **The role of substantial point defects in Ni-rich layered oxides as cathode materials in Li-ion and solid state batteries**
Juergen Janek, University of Giessen, Germany

12:00 – 12:40 **A new relaxation-focused approach and statistical analysis for an accelerated GITT**
David Mebane, West Virginia University, USA

12:40 – 13:40 Lunch

Session 4

Chair: **Regina Dittmann**, Forschungszentrum Juelich, Germany

13:40 – 14:20 **Mixed ion-electron transport in composite electrodes**
Chia-Chin Chen, National Taiwan University, Taiwan

14:20 – 15:00 **Kinetics of unmixing caused by electrochemical potential gradients**
Manfred Martin, RTWH Aachen University, Germany

15:00 – 15:40 **Halide ion demixing during illumination of highly crystalline Cesium Lead Bromide Iodide thin film: A combined cryo-EM, cathodoluminescence and phase field modelling study**
Paul McIntyre, Stanford University, USA

15:40 – 16:00 Coffee Break

16:00 – 16:40 **Photoionics: Monitoring and manipulating ion and defect fluxes with UV vis light**
Nicola Perry, University of Illinois Urbana-Champaign, USA

16:40 – 17:20 **High temperature UV response of CeO₂ system and its origin**
Mina Yamaguchi, Tohoku University, Japan

18:30 – 21:00 "Night Market" Dinner

Transportation to the Night Market dinner on Tuesday will be provided by bus from the Shangri-La Far Eastern Hotel

**All talks are scheduled for 40 min to accommodate 30 min presentations and 10 min Q&A

Wednesday, November 6, 2024

Session 5

Chairs: **Nicola Perry**, University of Illinois Urbana-Champaign, USA

- | | |
|---------------|---|
| 09:00 – 09:40 | Hydrogen in Bulk and Grain-boundaries of ABO_{3-d} Perovskites
Christopher Wolverton, Northwestern University, USA |
| 09:40 – 10:20 | Proton mobility in triple conductors: similarities and differences to electrolytes
Rotraut Merkle, Max Planck Institute, Germany |
| 10:20 – 10:40 | Coffee Break |
| 10:40 – 11:20 | Influence of oxygen nonstoichiometry change in the electrolyte on the impedance response of proton conducting ceramic cell air electrode
Koji Amezawa, Tohoku University, Japan |
| 11:20 – 12:00 | Electrochemical value of metal nanocatalysts supported on conductive oxide electrodes for oxygen exchange reactions
WooChul Jung, KAIST, South Korea |
| 12:00 – 12:30 | Pick up boxed lunch |
| 12:30 – 21:00 | Half-day excursion in Tainan & Banquet at Grand Banyan Hotel |

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Thursday, Nov 7, 2024

Session 6

Chair: **Ryan O'Hayre**, Colorado School of Mines, USA

- 08:00 – 08:40 **Design of mixed conducting organic semiconductors for electrochemical transistors**
Iain McCulloch, Princeton University, USA
- 08:40 – 09:20 **Optical tracking of mixed ionic-electronic transport in conjugated polymers**
Scott Keene, Rice University, USA
- 09:20 – 10:00 **Oxygen reduction on organic mixed ionic-electronic conducting polymers**
J. Tyler Mefford, University of California Santa Barbara, USA
- 10:00 – 10:20 Coffee Break
- 10:20 – 11:00 **Mixed electronic-protonic conductors for electrochemical synapses**
Bilge Yildiz, Massachusetts Institute of Technology, USA
- 11:00 – 11:40 **Ionic nanoarchitectonics to enhance various functional electronic device**
Kazuya Terabe, National Institute for Materials Science, Japan
- 11:40 – 12:40 Lunch

Session 7

Chair: **Scott Keene**, Rice University, USA

- 12:40 – 13:20 **Impact of nonstoichiometry on performance of cathode materials for Na-ion batteries**
Payam Kagahzchi, Forschungszentrum Juelich, Germany
- 13:20 – 14:00 **Design of artificial mixed-conducting composites by surface modification using atomic layer deposition**
Matthias T. Elm, University of Giessen, Germany
- 14:00 – 14:40 **Designing advanced energy materials: multiscale simulations of interfacial mechanisms in batteries and photocatalysts**
Hong-Kang Tian, National Cheng Kung University, Taiwan
- 14:40 – 15:00 Coffee Break
- 15:00 – 15:40 **How Co/Fe ratio affects defect structure, ionic transport, and surface exchange kinetics in the $\text{BaCo}_x\text{Fe}_{0.8-x}\text{Zr}_{0.1}\text{Y}_{0.1}\text{O}_{3-d}$ (BCFZY, $0.1 \leq x \leq 0.7$) triple-conducting system**
Ryan O'Hayre, Colorado School of Mines, USA
- 15:40 – 16:20 **ScO_6 octahedral networks weaken proton trapping in 70at% Sc-doped barium stannate**
Yoshihiro Yamazaki, Kyushu University, Japan
- 16:20 – 16:45 **Closing Remarks**
William Chueh, Stanford University, USA
Kuan-Zong Fung, National Cheng Kung University, Taiwan
Hitoshi Takamura, Tohoku University, Japan

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Mixed Conducting and Nonstoichiometric Compounds VIII

3-7 November 2024

National Cheng Kung University, Tainan, Taiwan

POSTER PRESENTATIONS

- 1 **Low temperature ALD surface engineering for high-performance solid oxide fuel cells**
Jiyeon Shin, Nanyang Technological University, Singapore
- 2 **Spectroscopic analysis of Cu^{2+} dissolved in BCZYYb and its impact on sinterability and proton conduction**
Yuto Unaki, Tohoku University, Japan
- 3 **Direct Measurement of Oxygen Potential Distribution Inside YSZ Electrolyte by Pt Probes**
You Yamaguchi, Tohoku university, Japan
- 4 **Triple-conducting BaCeO_3 - BaFeO_3 composites - phase formation, electronic structure, and defect distribution**
Rotraut Merkle, Max Planck Institute for Solid State Research, Stuttgart, Germany
- 5 **High-pressure synthesis and ion conduction of cubic borohydrides**
Yan Dai, Tohoku University, Japan
- 6 **Space charge effects in electronic, ionic, and mixed-conducting heterojunctions**
Shu-Han Chen, National Taiwan University, Taiwan
- 7 **Anisotropic ionic transport in polymer solid electrolyte.**
Yu-Chi Wang, Department of Chemical Engineering, National Taiwan University, Taiwan
- 8 **Exploring the Synergistic Effects of Cation and Anion Co-doping on Phase Transformation and Enhancement of Solid Oxide Cell Air Electrode Performance**
Seungwoo Roh, Seoul National University, South Korea
- 9 **Structure and stability of nonstoichiometric LiNiO_2**
Lars Winkler, Forschungszentrum Juelich, Germany, Germany
- 10 **Ammonia Decomposition Catalyst Based on h-BN Nanotube Support with Highly Dispersed Ruthenium**
Sewoong Lee, Seoul National University, South Korea
- 11 **Improving the reactivity of perovskite-oxide-based fuel electrodes for solid oxide cells by fluorine incorporation**
Yeongtaek Hong, Seoul National University, South Korea

Mixed Conducting and Nonstoichiometric Compounds VIII

3-7 November 2024

National Cheng Kung University, Tainan, Taiwan

POSTER PRESENTATIONS

- 12 **Influence of Synthesis on Crystallinity and Performance of Ni-rich Layered Oxides Cathode**
Yu-Fan Chen, NCKU, Taiwan
- 13 **Effect of lithium additive on properties of nickel-rich $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ cathode materials**
Yu-Hsuan Chen, NCKU, Taiwan
- 14 **Simultaneous visualization of phase formability, proton-conductivity, and structure property maps in perovskite oxides**
Kota Tsujikawa, Kyushu University, Japan