

Mixed Conducting and Nonstoichiometric Compounds VII

Tainan, Taiwan
3-7 November 2024

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Monday, November 4, 2024

08:45 – 09:00

Opening Session

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

Welcoming Remarks

Chuan-Pu Lu, National Cheng Kung University, Taiwan
Jow-Lay Huang, National Cheng Kung University, Taiwan

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...1

Han-Il Yoo, Seoul National University, South Korea

09:40 – 10:20

Diffusion and conduction over two sites with inherent partial occupancy...2

Truls Norby, University of Oslo, Norway

10:20 – 11:00

Controlling anion nonstoichiometry in mixed anion compounds...3

Hiroshi Kageyama, Kyoto University, Japan

11:00 – 11:20

Coffee Break

11:20 – 12:00

Dry and *operando* structural characterization of organic mixed conductors...4

Alberto Salleo, Stanford University, USA

12:00 – 12:40

Effects of electrolyte composition on the electrochemistry of organic mixed conducting polymers...5

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...6

Tatsuya Kawada, Tohoku University, Japan

14:20 – 15:00

Defect complexion induced electrostriction in doped ceria: origin and implications...7

Yue Qi, Brown University, USA

15:00 – 15:40

Atomistic insight into low-temperature cation ordering of Fe-added ceria-zirconia-based oxides...8

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...9

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 (IERS)...10
Mónica Burriel, Université Grenoble Alpes, France |
| 17:20 – 18:00 | Surface modification of perovskite electrodes for solid oxide cells...11
Pei-Chen Su, Nanyang Technological University, Singapore |
| 18:00 – 19:00 | Poster session |
| 19:00 – 21:00 | Dinner (Multifunction Room (1F) at NCKU) |

Tuesday, November 5, 2024

Session 3

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

- 09:00 – 09:40 **Memristive devices: from materials science to neuromorphic Hardware...12**
Qiangfei Xia, University of Massachusetts Amherst, USA
- 09:40 – 10:20 **Computing with drift and diffusive memristors...13**
J. Joshua Yang, University of Southern California, USA
- 10:20 – 11:00 **Ionic nanoarchitectonics to enhance various functional electronic devices...14**
Kazuya Terabe, National Institute for Materials Science, Japan
- 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...15**
Juergen Janek, University of Giessen, Germany
- 12:00 – 12:40 **A new relaxation-focused approach and statistical analysis for an accelerated GITT...16**
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...17**
Chia-Chin Chen, National Taiwan University, Taiwan
- 14:20 – 15:00 **Kinetics of unmixing caused by electrochemical potential gradients...18**
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...19**
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...20**
Nicola Perry, University of Illinois Urbana-Champaign, USA
- 16:40 – 17:20 **High temperature UV response of CeO₂ system and its origin...21**
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...22
Christopher Wolverton, Northwestern University, USA |
| 09:40 – 10:20 | Proton mobility in triple conductors: similarities and differences to electrolytes...23
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...24
Koji Amezawa, Tohoku University, Japan |
| 11:20 – 12:00 | Electrochemical value of metal nanocatalysts supported on conductive oxide electrodes for oxygen exchange reactions...25
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 |

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...N/A**
Iain McCulloch, Princeton University, USA
- 08:40 – 09:20 **Optical tracking of mixed ionic-electronic transport in conjugated polymers...26**
Scott Keene, Rice University, USA
- 09:20 – 10:00 **Oxygen reduction on organic mixed ionic-electronic conducting polymers...27**
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...28**
Bilge Yildiz, Massachusetts Institute of Technology, USA
- 11:00 – 11:40 **From nanoionic effects in valence change memories to neuromorphic Sensing...29**
Regina Dittmann, Forschungszentrum Juelich, Germany
- 11:40 – 12:40 Lunch

Session 7

Chair: **Bilge Yildiz**, Massachusetts Institute of Technology, USA

- 12:40 – 13:20 **Impact of nonstoichiometry on performance of cathode materials for Na-ion batteries...30**
Payam Kagahzchi, Forschungszentrum Juelich, Germany
- 13:20 – 14:00 **Design of artificial mixed-conducting composites by surface modification using atomic layer deposition...31**
Matthias T. Elm, University of Giessen, Germany
- 14:00 – 14:40 **Designing advanced energy materials: multiscale simulations of interfacial mechanisms in batteries and photocatalysts...32**
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...33**
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...34**
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

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

Mixed Conducting and Nonstoichiometric Compounds VIII

3-7 November 2024

National Cheng Kung University, Tainan, Taiwan

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- 1 **Spectroscopic analysis of Cu^{2+} dissolved in BCZYYb and its impact on sinterability and proton conduction...35**
Yuto Unaki, Tohoku University, Japan
- 2 **Direct Measurement of Oxygen Potential Distribution Inside YSZ Electrolyte by Pt Probes...36**
You Yamaguchi, Tohoku university, Japan
- 3 **Triple-conducting BaCeO_3 - BaFeO_3 composites - phase formation, electronic structure, and defect distribution...37**
Rotraut Merkle, Max Planck Institute for Solid State Research, Stuttgart, Germany
- 4 **High-pressure synthesis and ion conduction of cubic borohydrides...38**
Yan Dai, Tohoku University, Japan
- 5 **Space charge effects in electronic, ionic, and mixed-conducting heterojunctions...39**
Shu-Han Chen, National Taiwan University, Taiwan
- 6 **Anisotropic ionic transport in polymer solid electrolyte...40**
Yu-Chi Wang, Department of Chemical Engineering, National Taiwan University, Taiwan
- 7 **Exploring the Synergistic Effects of Cation and Anion Co-doping on Phase Transformation and Enhancement of Solid Oxide Cell Air Electrode Performance...41**
Seungwoo Roh, Seoul National University, South Korea
- 8 **Structure and stability of nonstoichiometric LiNiO_2 ...42**
Lars Winkler, Forschungszentrum Juelich, Germany, Germany
- 9 **Ammonia Decomposition Catalyst Based on h-BN Nanotube Support with Highly Dispersed Ruthenium...43**
Sewoong Lee, Seoul National University, South Korea
- 10 **Improving the reactivity of perovskite-oxide-based fuel electrodes for solid oxide cells by fluorine incorporation...44**
Yeongtaek Hong, Seoul National University, South Korea
- 11 **Influence of Synthesis on Crystallinity and Performance of Ni-rich Layered Oxides Cathode...45**
Yu-Fan Chen, NCKU, Taiwan

Mixed Conducting and Nonstoichiometric Compounds VIII

3-7 November 2024

National Cheng Kung University, Tainan, Taiwan

POSTER PRESENTATIONS

- 12 **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...46**
Yu-Hsuan Chen, NCKU, Taiwan
- 13 **Simultaneous visualization of phase formability, proton-conductivity, and structure property maps in perovskite oxides...47**
Kota Tsujikawa, Kyushu University, Japan
- 14 **Investigation of high energy-density Porous LTO electrode through ceramic processing control...48**
Ze-Ren Jhang, National Cheng Kung University (NCKU), Taiwan
- 15 **The impact of LLTO thinning on lithium content for lithium-sulfur battery research...49**
Manishvarun Manivannan, National Cheng Kung University (NCKU), Taiwan
- 16 **A Wet Chemical Pre-lithiation Strategy for SiO_x/C Anodes to Enhance Initial Coulombic Efficiency of Lithium-Ion Batteries...50**
Bo-Wei Chen, National Cheng Kung University (NCKU), Taiwan
- 17 **Preparation of Thick $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ (NCA) Cathode based on a Novel Deposition Technique...51**
Ray-Rong Tang, National Cheng Kung University (NCKU), Taiwan
- 18 **Structural Evolution of Ni-rich NCMA Layered Oxide Cathode based on Solid State Reaction...52**
Ying-Yi Chen, National Cheng Kung University (NCKU), Taiwan
- 19 **Charge Transport and Carrier Chemistry in Composite Battery Electrodes...N/A**
Le-Yen Lin, National Taiwan University, Taiwan
- 20 **Oxidative Nonstoichiometry and Proton-Hole Observation Ba-Zr-Based Proton Conductors...53**
Ryoga Sato, Tohoku University, Japan