

[Back to Symposia Sessions](#)

Symposium EE4 : Electrode Materials and Electrolytes for Lithium and Sodium Ion Batteries

Mar 28

Mar 29

Mar 30

Mar 31

Apr 01

2016-03-30 [Show All Abstracts](#)

Symposium Organizers

Mariappan Parans Paranthaman, Oak Ridge National Laboratory

Ayyakkannu Manivannan, USDOE/NETL

Yang-Kook Sun, Hanyang University

Donghai Wang, The Pennsylvania State University

Symposium Support

Aldrich Materials Science

EE4.4: Novel Electrolytes and Architectures

Session Chairs

Arumugam Manthiram

Wednesday AM, March 30, 2016

PCC North, 100 Level, Room 124 A

9:00 AM - *EE4.4.01

A New Class of Single Ion Conducting Electrolyte ($t^+ = 1$); Pure Alkali Cation Plastic Crystals

[C. Austen Angell](#)₁

₁ Arizona State Univ Tempe United States,

[Show Abstract](#)

9:30 AM - EE4.4.02

Hierarchical MoS₂-Carbon Microspheres: A Robust Anode for High Performance Lithium Ion Battery

[Gen Chen](#)₁, [Hongmei Luo](#)₁

₁ New Mexico State University Las Cruces United States,

[Show Abstract](#)

9:45 AM - EE4.4.03

Understanding of the Electrochemical Mechanism of SnSb, a Promising Anode for LiB, by Operando Techniques#xD;

[Philippe Antitomaso](#)₁, [Françoise Morato](#)₁, [Bernard Fraise](#)₁, [Laure Monconduit](#)₂, [David Ayme-Perrot](#)₃, [Philippe Girard](#)₄

₁ Institut Charles Gerhardt de Montpellier UMR 5253 CNRS Montpellier France, ₁ Institut Charles Gerhardt de Montpellier UMR 5253 CNRS Montpellier France, ₂ Réseau sur le Stockage Electrochimique de l'Energie Paris France, ₃ Hutchinson Chalette-sur-Loing France, ₄ Total Paris France

[Show Abstract](#)

10:00 AM -

BREAK

10:30 AM - *EE4.4.04

Epitaxial VO₂(B) Thin-Films as Capacity-Fading-Free Electrodes

[Shinbuhm Lee](#)₁, [Xiang Gao](#)₁, [Xiao-Guang Sun](#)₁, [Andrew Lubimtsev](#)₁, [Panchapakesan Ganesh](#)₁, [Tricia Meyer](#)₁, [Yunchao Li](#)₁, [Matthew Chisholm](#)₁, [Sung Seok Seo](#)₂, [John Freeland](#)₃, [Ho Nyung Lee](#)₁

¹ Oak Ridge National Laboratory Oak Ridge United States,² University of Kentucky Lexington United States,³ Argonne National Laboratory Argonne United States

[Show Abstract](#)

11:00 AM - EE4.4.05

In Situ Mapping of State-of-Charge Dynamics in Lithium-Ion Batteries

Ming Ke ¹, Joon Sang Kang ¹, [Yongjie Hu](#) ¹

¹ Mechanical and Aerospace Engineering University of California, Los Angeles Los Angeles United States,

[Show Abstract](#)

11:15 AM - EE4.4.06

Synthesis and Characterization of Empty Silicon Clathrates for Anode Applications in Li-Ion Batteries

[Kwai Chan](#) ¹, Michael Miller ¹, Carol Ellis-Terrell ¹, Candace Chan ²

¹ Southwest Research Inst San Antonio United States,² Arizona State University Tempe United States

[Show Abstract](#)

11:30 AM - EE4.4.07

Cycling and Aging Studies of Li-Based Cathode Materials via Aberration-Corrected STEM

[Patrick Phillips](#) ¹, Javier Barenó ², Daniel Abraham ², Robert Klie ¹

¹ Univ of Illinois-Chicago Chicago United States,² Argonne National Lab Argonne United States

[Show Abstract](#)

11:45 AM - EE4.4.08

Development of Conjugated Organic Lithium Carboxylate with Improved Rate Capability for Li-Ion Battery

Lionel Fedele ³, Frederic Sauvage ³, [Matthieu Becuwe](#) ³

¹ Laboratoire de Réactivité et Chimie des Solides Amiens France,² Institut de Chimie de Picardie Amiens France,³ Réseau sur le Stockage Electrochimique de l'Energie Amiens France,

[Show Abstract](#)

EE4.5: Solid Electrolytes and Novel Electrodes

Session Chairs

Gao Liu

Wednesday PM, March 30, 2016
PCC North, 100 Level, Room 124 A

1:45 PM - *EE4.5.01

Self-Assembly Synthesis of Electrode Architectures for Energy Storage

[Sheng Dai](#) ²

¹ Chemical Sciences Division Oak Ridge National Laboratory Oak Ridge United States,² Department of Chemistry University of Tennessee Knoxville United States,

[Show Abstract](#)

2:15 PM - EE4.5.02

Synthesis and Characterization of a New Fast Lithium-Ion Conductor $\text{Li}_{7-x-y}\text{La}_3\text{Zr}_{2-x-y}\text{Nb}_x\text{Ta}_y\text{O}_{12}$

Maria Maier₁, Thomas Mayerhoefer₂, Andreas Welzl₃, Maurizio Musso₁, Sonja Hoefer₂, Daniel Rettenwander₁, Juergen Popp₄, Juergen Fleig₃, Georg Amthauer₁

₁ Department of Chemistry and Physics of Materials Paris Lodron University of Salzburg Salzburg Austria, ₂ Leibniz Institute of Photonic Technologies Jena Germany, ₃ Institute for Chemical Technologies and Analytics Vienna University of Technology Vienna Austria, ₂ Leibniz Institute of Photonic Technologies Jena Germany, ₄ Institute of Physical Chemistry and Abbe Center of Photonics Friedrich Schiller University Jena Jena Germany

Show Abstract

2:30 PM - EE4.5.03

Enhancing Ionic Transport through the Mesoscopic Scale: A Case Study of the Perovskite Solid Electrolyte for Li Batteries

Miaofang Chi₁, Cheng Ma₁, Karren More₁, Ce-wen Nan₂, Nancy Dudney₁

₁ Oak Ridge National Laboratory Oak Ridge United States, ₂ Tsinghua University Beijing China

Show Abstract

2:45 PM - EE4.5.04

Structural and Ionic Transport Properties of LISICON and NASICON Solid Electrolyte Materials

Yue Deng₁, Chris Eames₂, Jean-Noel Chotard₁, Oliver Pecher₃, Clare Grey₃, Christian Masquelier₁, Saiful Islam₂

₁ Laboratoire de Réactivité et Chimie des Solides Université de Picardie Jules Verne Amiens France, ₂ Department of Chemistry University of Bath Bath United Kingdom, ₃ Department of Chemistry University of Cambridge Cambridge United Kingdom

Show Abstract

**3:00 PM -
BREAK****3:30 PM - *EE4.5.05**

Development of High Area Loading and Stable Sulfur Electrode through Interface Functionality Design for Lithium Sulfur Battery

Gao Liu₁, Min Ling₁

₁ Energy Storage and Distributed Resource Division, Energy Technologies Area Lawrence Berkeley National Laboratory Berkeley United States,

Show Abstract

4:00 PM - EE4.5.06

A Low-Cost Carbon Composite Anode Material from Recycled Waste Tires for Lithium-Ion Batteries

Joseph Gnanaraj₁, Rich Lee₁, Alan Levine₁, Jonathan Wistrom₂, Skyler Wistrom₂, Yunchao Li₃, Jianlin Li₅, Amit Naskar₄, Mariappan Paranthaman₃

₁ Energy Division RJ Lee Group Monroeville United States, ₂ Practical Sustainability Maryville United States, ₃ Chemical Sciences Division Oak Ridge National Laboratory Oak Ridge United States, ₅ Energy and Transportation Science Division Oak Ridge National Laboratory Oak Ridge United States, ₄ Materials Science and Technology Division Oak Ridge National Laboratory Oak Ridge United States

Show Abstract

4:15 PM - EE4.5.07

Solid-Like Biomimetic Ion-Channel Electrolytes for Lithium Metal Batteries

Addis Fuhr ², Li Shen ¹, Hao Bin Wu ¹, Xiao-Feng Wang ³, Anastassia Alexandrova ⁴, Yunfeng Lu ¹

¹ Chemical and Biomolecular Engineering University of California, Los Angeles Los Angeles United States, ² C-PCS Los Alamos National Laboratory Los Alamos United States, ¹ Chemical and Biomolecular Engineering University of California, Los Angeles Los Angeles United States, ³ School of Chemistry and Chemical Engineering University of South China Hengyang China, ⁴ Chemistry and Biochemistry University of California, Los Angeles Los Angeles United States

Show Abstract

4:30 PM - EE4.5.08

Temperature Dependence of Electrolyte Oxidation at Charged NCM Cathode Surface

Adam Tornheim ¹, Meinan He ², Chi-Cheung Su ¹, Chen Liao ¹, Javier Bareno ¹, Ira Bloom ¹, Zhengcheng Zhang ¹

¹ Argonne National Laboratory Lemont United States, ¹ Argonne National Laboratory Lemont United States, ² Worcester Polytechnic Institute Worcester United States

Show Abstract

4:45 PM - EE4.5.09

Hybridization of Transition Metal Carbides (MXene) and Oxides for High Performance Li-Ion Storage

Mengqiang Zhao ¹, Michelle Torelli ¹, Chang Ren ¹, Michael Ghidui ¹, Michel Barsoum ¹, Yury Gogotsi ¹

¹ Drexel Univ Philadelphia United States,

Show Abstract

EE4.6: Poster Session II

Session Chairs

Joseph Gnanaraj

Wednesday PM, March 30, 2016

Sheraton, Third Level, Phoenix Ballroom

8:00 PM - EE4.6.01

N-Doping Effect of di-Vacancy Graphene on Oxygen Reduction Reaction (ORR) of Lithium-Air Battery

Young Hoon Yoon ¹, Ji Hye Lee ¹, Seung Geol Lee ¹

¹ Pusan National University Busan Korea (the Republic of),

Show Abstract

8:00 PM - EE4.6.02

Conductive Interwoven Bamboo Carbon Fibers Membrane for Li-S Batteries

Xingxing Gu ², Yanglong Hou ², Shanqing Zhang ¹

¹ School of Environment Griffith Univ Gold Coast Australia, ² Department of Materials Science and Engineering, College of Engineering Peking University Beijing China, ² Department of Materials Science and Engineering, College of Engineering Peking University Beijing China, ¹ School of Environment Griffith Univ Gold Coast Australia

Show Abstract

8:00 PM - EE4.6.03

Enhanced Efficiency of Sulfur Cathode via Cryogenic Grinding of Glassy-Like Sulfur for Application in Li-s Batteries

Milos Krbal ¹, Tomas Kazda ², Miloslav Pouzar ³, Jan Macak ¹, Andrea Strakova Fedorkova ⁴, Jiri Vondrak ²

¹ Center of Materials and Nanotechnologies (CEMNAT) University of Pardubice Pardubice Czech Republic, ² Institute of Electrotechnology Brno University of Technology Brno Czech Republic, ³ Institute of Environmental and Chemical Engineering

University of Pardubice Pardubice Czech Republic⁴ Department of Physical Chemistry P. J. Safarik University Kosice Slovakia

Show Abstract

8:00 PM - EE4.6.04

Synthesis and Characterization of Substituted Garnet and Perovskite Based Lithium-Ion Conducting Solid Electrolytes

Maria Abreu Sepulveda ², Dominique Williams ², Ashfia Huq ³, Chetan Dhital ³, Yunchao Li ³, Mariappan Parans Paranthaman ³, Karim Zaghib ⁴, A. Manivannan ⁵

¹ University of Rochester Rochester United States, ² National Energy Technology Laboratory Morgantown United States, ² National Energy Technology Laboratory Morgantown United States, ³ Chemical Sciences Division Oak Ridge National Laboratory Oak Ridge United States, ⁴ Hydro-Québec Quebec Canada, ⁵ West Virginia University Morgantown United States

Show Abstract

8:00 PM - EE4.6.05

Synergistic Sodiatio of Transition Metal Oxide and Carbon Nanotubes (CNTs) Nanostructured Composite Electrodes for Sodium-Ion Battery

Qianqian Li ¹, Jinsong Wu ¹, Vinayak Dravid ¹

¹ Department of Materials Science and Engineering, The NUANCE Center Northwestern University Evanston United States,

Show Abstract

8:00 PM - EE4.6.06

A Study of Tin Dioxide-Graphene Oxide Composite for Supercapacitor Applications

Frank Mendoza ², Valerio Dorvilien ², Laura Mendez ⁴, Samuel Escobar ², Brad Weiner ², Gerardo Morell ²

¹ University of Puerto Rico - Rio Piedras San Juan United States, ² Institute for Functional Nanomaterials San Juan United States, ³ University of Puerto Rico San Juan United States, ⁴ Medica Sciences University of Puerto Rico San Juan United States

Show Abstract

8:00 PM - EE4.6.07

Effect of CeO₂ Nanoparticles Modification on Porous Carbon for High-Capacity Super-Capacitor Application

Mohammad Shuvo ¹, Hasanul Karim ¹, Md Islam ¹, Gerardo Rodriguez ¹, Ricardo Martinez ¹, Ivan Gastelum ¹, Manjula Nandasiri ², Ashleigh Schwarz ², Arun Devaraj ², Juan Noveron ¹, Murugesan Vijayakumar ², Yirong Lin ¹, Hoejiun Kim ¹

¹ University of Texas at El Paso El Paso United States, ² Pacific Northwest National Lab Richland United States

Show Abstract

8:00 PM - EE4.6.08

Neutron Scattering Studies of Lithium-Ion Diffusion in Ternary Phosphate Glasses

Gavin Hester ¹, Tom Heitmann ², Madhusudan Tyagi ³, Munesh Rathore ⁴, Anshuman Dalvi ⁴, Saibal Mitra ¹, Souleymane Diallo ⁵, Eugene Mamontov ⁵

¹ Physics, Astronomy, and Materials Science Missouri State University Springfield United States, ² Materials Science University of Missouri Research Reactor Columbia United States, ³ National Center for Neutron Research National Institute of Standards and Technology Gaithersburg United States, ⁴ Birla Institute of Science and Technology Pilani India, ⁵ Chemical and Engineering Materials Division Oak Ridge National Laboratory Oak Ridge United States

Show Abstract

8:00 PM - EE4.6.09

Morphological Evolution of Multilayer Ni/NiO Thin-Film Anodes during Lithiation

Guennadi Evmenenko¹, Timothy Fister², D. Bruce Buchholz¹, Xiao Chen¹, Jennifer Esbenschade³, Qianqian Li⁴, Jinsong Wu⁴, Vinayak Dravid⁴, Paul Fenter², Michael Bedzyk¹

¹ Department of Materials Science and Engineering Northwestern University Evanston United States, ² Chemical Science and Engineering Argonne National Laboratory Lemont United States, ³ Department of Chemistry University of Illinois at Urbana-Champaign Urbana United States, ⁴ EPIC, NUANCE Center Northwestern University Evanston United States

Show Abstract

8:00 PM - EE4.6.10

Fabrication of a Novel Nanostructured SnO₂/LiCoO₂ Lithium-Ion Cell

Mark Poyner¹, Indumini Jayasekara¹, Dale Teeters¹

¹ University of Tulsa Tulsa United States,

Show Abstract

8:00 PM - EE4.6.11

Pyrolyzed Cellulose Paper Based Sulfur Cathode for High-Performance and Cost-Effective Lithium-Sulfur Batteries

Shiqi Li², Guofeng Ren¹, Zhaoyang Fan¹

¹ Department of Electrical and Computer Engineering Texas Tech University Lubbock United States, ² Department of Science and Technology Chongqing Public Security Bureau Chongqing China, ¹ Department of Electrical and Computer Engineering Texas Tech University Lubbock United States

Show Abstract

8:00 PM - EE4.6.12

Synthesis and Li-Ion Transport Properties of Garnet-Type Li-Ion Conductor Li_{7-x}La₃Zr_{2-x}Bi_xO₁₂

Reinhard Wagner¹, Daniel Rettenwander¹, Gerold Tippelt¹, Guenther Redhammer¹, Walter Schmidt², Martin Wilkening², Georg Amthauer¹

¹ Department of Materials Research and Physics University of Salzburg Salzburg Austria, ² Christian Doppler Laboratory for Lithium Batteries, Institute for Chemistry and Technology of Materials Graz University of Technology Graz Austria

Hide Abstract

Li-stuffed oxide garnets combine a high Li-ion conductivity with an excellent chemical and thermal stability and electrochemical inertness, in particular against Li metal. Thus, these materials are excellent candidates for solid electrolytes in Li-ion and Li-oxygen batteries.^{1,2} Within this group, Li₇La₃Zr₂O₁₂ (LLZO) garnet and its variants are among the most promising materials. Pure LLZO occurs in at least two structural modifications: (i) a low-temperature tetragonal phase (space group *I4₁/acd*) and (ii) a high-temperature cubic phase (space group *Ia-3d*). In terms of applications, the cubic phase is much more desirable as its ion conductivity is two orders of magnitude higher (10⁻⁴-10⁻³ S/cm) compared to the tetragonal polymorph (about 10⁻⁶ S/cm).³ The cubic phase is not stable at room temperature and has to be stabilized by doping of LLZO with aliovalent cations.²

The unit-cell parameter and the Li content influence Li-ion conductivity properties of Li-stuffed oxide garnets.⁴ To obtain a larger unit-cell parameter as well as a high Li content, we partially replaced Zr⁴⁺ with Bi⁵⁺; as the unit-cell parameter of Li₅La₃Bi₂O₁₂ is as large as 13.065 Å.⁵ Cubic LLZO was successfully stabilized by partial replacement of Zr⁴⁺ with Bi⁵⁺. A significant increase of the unit-cell parameter with increasing Bi⁵⁺ content was confirmed by X-ray powder diffraction. Bi⁵⁺ stabilized LLZO showed a unit-cell parameter of up to 13.07 Å, compared to a unit-cell parameter of 12.97 Å for LLZO doped with Ga³⁺, Fe³⁺ or Al³⁺.^{4,5} The reason for this different behavior might be related to the crystallographic position and crystal-chemical properties of the dopant cation. Long-range ion transport properties of Bi⁵⁺ stabilized LLZO as a function of the Bi⁵⁺ content and, therefore, the influence of the unit-cell parameter on ion dynamics will be investigated by electrochemical impedance spectroscopy as well as ⁷Li NMR measurements. Results about Li-ion dynamics and electrochemical properties of Bi⁵⁺ stabilized LLZO will be presented as well.

¹ Cussen, E.J.; J. Mat. Chem. **2010**, *20*, 5167-5173.

² Thangadurai, V.; et al.; Chem. Soc. Rev. **2014**, *43*(13), 4714-4727.

³ Buschmann, H.; et al.; Phys. Chem. Chem. Phys. **2011**, *13*, 19378-19392.

⁴ Zeier, W. G.; Dalton Trans., **2014**, *43*, 16133-16138

⁵ Murugan, R.; et al.; Mat. Sci. Eng. B **2007**, *143*, 14-20

8:00 PM - EE4.6.13

Crystal Structure of Garnet-Related Li-Ion Conductor $\text{Li}_{7-3x}\text{Ga}_x\text{La}_3\text{Zr}_2\text{O}_{12}$: Fast Li-Ion Conduction Caused by a Different Cubic Modification

Reinhard Wagner¹, Guenther Redhammer¹, Daniel Rettenwander¹, Maria Maier¹, Walter Schmidt², Martin Wilkening², Anatoliy Senyshyn³, Georg Amthauer¹

¹ Department of Materials Research and Physics University of Salzburg Salzburg Austria, ² Christian Doppler Laboratory for Lithium Batteries, Institute for Chemistry and Technology of Materials Graz University of Technology Graz Austria, ³ Research Neutron Reactor ZWE FRM-II Munich University of Technology Garching Germany

Show Abstract

8:00 PM - EE4.6.14

Low-Cost Carbon Composite Anodes for Sodium-Ion Batteries

Yunchao Li², Kokouvi Akato², Alan Levine³, Rich Lee³, Amit Naskar², Sang Kim⁵, Arumugam Manthiram⁵, Jinshui Zhang¹, Sheng Dai¹, Mariappan Paranthaman²

¹ Chemical Sciences Division Oak Ridge National Laboratory Oak Ridge United States, ² The Bredesen Center for Interdisciplinary Research and Graduate Education The University of Tennessee Knoxville United States, ³ RJ Lee Group Monroeville United States, ⁴ Materials Science and Technology Division Oak Ridge National Laboratory Oak Ridge United States, ² The Bredesen Center for Interdisciplinary Research and Graduate Education The University of Tennessee Knoxville United States, ⁵ Texas Materials Institute The University of Texas at Austin Austin United States, ¹ Chemical Sciences Division Oak Ridge National Laboratory Oak Ridge United States

Show Abstract

8:00 PM - EE4.6.15

Effect of Carbon Coating on $\text{NaMn}_{0.33}\text{Ni}_{0.33}\text{Co}_{0.33}\text{O}_2$ by Functionalized MWCNTs for Sodium-Ion Batteries

Vijay Shankar Rangasamy¹, Savitha Thayumanasundaram¹, Seo Jin Won¹, Jean-Pierre Locquet¹

¹ KU Leuven Heverlee Belgium,

Show Abstract

8:00 PM - EE4.6.16

Highly Effective Water-Soluble Binder for Li-S Battery Inspired by Paper Wet-Strengthening Chemistry

Jaebeom Jeon¹, Yeon Sik Jung¹

¹ Korea Advanced Institute of Science and Technology Daejeon Korea (the Republic of),

Show Abstract

8:00 PM - EE4.6.17

A Microcontact Impedance Study on NASICON-Type $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ ($0 \leq x \leq 0.5$) Single Crystals

Daniel Rettenwander¹, Andreas Welzl², Sylke Pristat³, Frank Tietz⁴, Stefanie Taibl², Guenther Redhammer¹, Juergen Fleig², Reinhard Wagner¹

¹ Department of Material Science and Physics University of Salzburg Salzburg Austria, ² Institute for Chemical Technologies and Analytics Vienna University of Technology Vienna Austria, ³ Materials Synthesis and Processing (IEK-1) Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research Jülich Germany, ⁴ Materials Synthesis and Processing (IEK-1) Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research Jülich Germany, ⁴ Helmholtz-Institute Münster, c/o Forschungszentrum Jülich GmbH Jülich Germany

Hide Abstract

$\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ (LATP) with NASICON-type structure (**Na Super-Ionic Conductor**, with space group) is a promising solid electrolyte with total Li^+ ion conductivity of approximately 10^{-4} - 10^{-3} S cm^{-1} .¹ Due to the very high bulk Li^+ conductivity in this class of materials the corresponding arc in the complex impedance plane response in the high MHz range and can be only resolved at very low temperatures.^{2,3} Determination of the Li^+ bulk conductivity is strongly simplified when large sized single crystals are

available; as for polycrystalline pellets macroscopic electrodes may be used in electrical measurements and electrical properties can be determined without being restricted by the need for a proper separation of partly large grain boundary resistances. For LATP, however, as for many other oxides, such large single crystals are not available. Here, a modification of conventional impedance spectroscopy comes into play: microelectrodes deposited on large grains of a polycrystalline sample still allow impedance measurements which are unaffected by the resistivity of grain boundaries.⁴⁻⁶ This is caused by the spatially very constricted current distribution between neighboring microelectrodes. However, so far this technique of local impedance measurements was rarely applied to determine Li⁺ bulk conductivities in small single crystals.

In this contribution, for the first time microcontact impedance spectroscopy was applied to small LATP single crystals to exactly determine the Li⁺ bulk conductivity at room temperature. The resulting Li⁺ conductivity is thus independent of microstructural effects (e.g., grain sizes, grain boundaries, and density/porosity). In addition, the single crystals were carefully characterized by single crystal X-ray diffraction (SCXRD) and this enables a precise analysis of the impact of Al³⁺ substitution (e.g., crystal structure, Li⁺ content) on transport properties and a better understanding of the structure–property relationship of Li⁺-based NASICON materials.

1. Aono, H., Sugimoto, E., Sadaoka, Y., Imanaka, N., Adachi, G. *J. Electrochem. Soc.*, **1990**, 137, 1023-1027.

2. S. Breuer, V. Epp, Q. Ma, F. Tietz and M. Wilkening, *J. Mater. Chem. A*, 2015, **3**, 21343

3. Wang, S.; Ben, L.; Li, H.; Chen, L. *Solid State Ionics*, **2014**, 268, 110-116.

4. J. Fleig, S. Rodewald and J. Maier, *J. Appl. Phys.*, 2000, **87**, 2372.

5. S. Rodewald, J. Fleig and J. Maier, *J. Am. Ceram. Soc.*, 2001, **84**, 521.

6. J. Fleig, S. Rodewald and J. Maier, 2000, 905.

8:00 PM - EE4.6.18

In Situ Transmission Electron Microscopy Observation of Conversion Reaction in SnO₂ Nanoparticle Using Graphene Liquid Cell

Joon Ha Chang², Jun Young Cheong², Sung Joo Kim², Hyeon Kook Seo², Jong Min Yuk², Il-Doo Kim², Jeong Yong Lee²

¹ Center for Nanomaterials and Chemical Reactions, Institute for Basic Science (IBS) Daejeon Korea (the Republic of),² Department of Materials Science and Engineering Korea Advanced Institute of Science and Technology (KAIST) Daejeon Korea (the Republic of),² Department of Materials Science and Engineering Korea Advanced Institute of Science and Technology (KAIST) Daejeon Korea (the Republic of)

Show Abstract

8:00 PM - EE4.6.19

Design and Synthesis of New Quinone-Based Organic Materials for Long-Life and High-Rate Lithium Batteries

Joungphil Lee¹, Moon Jeong Park²

¹ Chemistry POSTECH Pohang Korea (the Republic of),¹ Chemistry POSTECH Pohang Korea (the Republic of),² Advanced Materials Sciences POSTECH Pohang Korea (the Republic of)

Show Abstract

8:00 PM - EE4.6.20

Step Conformal Solid Electrolyte Deposited by ALD on Robust 3D Silicon Scaffold for on Chip Li-Ion Microbattery

Manon Letiche⁴, Etienne Eustache⁴, Jeremy Freixas⁴, Laurence Morgenroth², Pascal Tilmant², Pascal Roussel¹, Thierry Brousse⁴, Christophe Lethien⁴

¹ UCCS Lille France,² IEMN Lille France,⁴ Réseau sur le Stockage Electrochimique de l'Énergie Amiens France,³ IMN Nantes France,² IEMN Lille France,⁴ Réseau sur le Stockage Electrochimique de l'Énergie Amiens France² IEMN Lille France,¹ UCCS Lille France³ IMN Nantes France,⁴ Réseau sur le Stockage Electrochimique de l'Énergie Amiens France² IEMN Lille France,⁴ Réseau sur le Stockage Electrochimique de l'Énergie Amiens France

Show Abstract

8:00 PM - EE4.6.21

Experimental Phase Studies in the La-X-Ni-O (X=Mg, Ca, Sr) System for Metal-Air Batteries

Gizem Soydan¹, Emin Kondakci¹, Nuri Solak¹

¹ Metallurgical and Materials Engineering Istanbul Technical University Istanbul Turkey,

Show Abstract

8:00 PM - EE4.6.22TiO₂-Coated Mesoporous Carbon Cathode for Lithium-Sulfur BatterySe Min Oh ¹, Yun Seok Choi ¹, [Xing Jin](#) ¹, Ji Man Kim ¹¹ Chemistry Sungkyunkwan University Suwon Korea (the Republic of),[Show Abstract](#)**8:00 PM - EE4.6.23**

CNT Sponge-Based Sulfur Cathodes with GO-Enhanced Separator for Lithium-Sulfur Batteries

[Keisuke Hori](#) ¹, Kei Hasegawa ¹, Yuta Nishina ², Suguru Noda ¹¹ Department of Applied Chemistry Waseda University Tokyo Japan, ² Research Core for Interdisciplinary Sciences Okayama University Okayama Japan[Show Abstract](#)**8:00 PM - EE4.6.24**Preparation of Nanostructured Li₇La₃Zr₂O₁₂ Solid Electrolyte via Templating on Nanocellulose Fibrils and Size Dependency of Phase Transformation[Zachary Gordon](#) ¹, Ting Yang ¹, Candace Chan ¹¹ Arizona State University Tempe United States,[Show Abstract](#)**8:00 PM - EE4.6.25**Preparation of High Lithium Ion Conductive, Multi-Doped Li₇La₃Zr₂O₁₂ Solid Electrolyte[Dong Ok Shin](#) ¹, Kyungbae Oh ², Kwang Man Kim ¹, Kyu-Young Park ², Byungju Lee ², Young-Gi Lee ¹, Kisuk Kang ²¹ Electronics and Telecommunications Research Institute (ETRI) Daejeon Korea (the Republic of), ² Seoul National University Seoul Korea (the Republic of)[Show Abstract](#)**8:00 PM - EE4.6.27**Electrospinning of Nanostructured Li₇La₃Zr₂O₁₂ Solid Electrolytes and Its Particle Size-Dependent Phase Transformation[Ting Yang](#) ¹, Zachary Gordon ², Ying Li ¹, Candace Chan ¹¹ Materials Science and Engineering Arizona State University Tempe United States, ² Chemical Engineering Arizona State University Tempe United States[Show Abstract](#)**8:00 PM - EE4.6.28**

Inexpensively Synthesized Tin and Antimony-Based Nanocrystals as Electrode Material for Lithium-Ion and Sodium-Ion Batteries

[Marc Walter](#) ², Simon Doswald ², Maksym Kovalenko ²¹ Laboratory of Inorganic Chemistry ETH Zurich Zurich Switzerland, ² Empa - Swiss Federal Laboratories for Materials Science and Technology Dübendorf Switzerland,[Show Abstract](#)**8:00 PM - EE4.6.29**

High Capacity, Safe and Stable Anode/Electrolyte for Lithium-Ion Batteries

Yuzi Zhang ¹, Yanjing Chen ¹, Brett Lucht ¹, Arijit Bose ¹

¹ Univ of Rhode Island Kingston United States,

Show Abstract