**SYMPOSIUM ES3**

Materials for Multivalent Electrochemical Energy Storage
April 18 - April 20, 2017

**Symposium Organizers**
Veronica Augustyn, North Carolina State University
Doron Aurbach, Bar-Ilan University
Y. Shirley Meng, University of California, San Diego
Naoaki Yabuuchi, Tokyo Denki University

**Symposium Support**
Bio-Logic USA
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**Proceedings Statement**
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* Invited Paper

**SESSION ES3.1: High-Capacity Li Intercalation**
Session Chairs: Valerie Pralong and M Stanley Whittingham
Tuesday Afternoon, April 18, 2017
PCC North, 200 Level, Room 226 A

1:30 PM *ES3.1.01
Multi-Electron Cathodes—Two Li vs One Mg Intercalation Using Ti and V Model Compounds M Stanley Whittingham; Binghamton University, United States.

2:00 PM ES3.1.02
Comparative Ab Initio Study of Li, Na, Mg, and Al Insertion in Vanadium Pentoxides and Dioxides Sergei Manzhos; National University of Singapore, Singapore.

2:15 PM *ES3.1.03

2:45 PM ES3.1.04
Structure and Electrochemistry of Transition Metal Substituted ε-VOPO4 Carrie Siu; Binghamton University, United States.

3:00 PM BREAK

**SESSION ES3.2: High-Capacity Intercalation**
Session Chairs: Ismael Saadoune and Naoaki Yabuuchi
Tuesday Afternoon, April 18, 2017
PCC North, 200 Level, Room 226 A

3:30 PM *ES3.2.01
Na$_{x}$Co$_{0.5}$Mn$_{0.5}$Ni$_{0.4}$O$_{2}$ (x=0, 2/3, 1/2, 1/3, 1) Layered Oxides as Good Cathode Materials for Sodium-Ion Batteries Saadoune Ismael; Université Cadi Ayyad, Morocco.

4:00 PM ES3.2.02
Room-Temperature Na–CuCl Rechargeable Battery Using SO$_{2}$-Based Non-Flammable Inorganic Liquid Electrolyte Hyunsook Kim; Hanyang University, Korea (the Republic of).

**SESSION ES3.3: Mg Intercalation**
Session Chairs: Yury Gogotsi and Kisuk Kang
Wednesday Morning, April 19, 2017
PCC North, 200 Level, Room 226 A

8:00 AM *ES3.3.01
The Mg-Ion Storage Capability of MXenes Yury Gogotsi; Drexel University, United States.

8:30 AM ES3.3.02
Controlling Interlayer Interactions in Vanadium Pentoxide-Poly(ethylene oxide) Nanocomposites for Enhanced Magnesium-Ion Charge Transport and Storage Christopher Rhodes; Texas State University, United States.

8:45 AM ES3.3.03
First-Principles Design of Cathode Materials for Mg Batteries—The Role of Anion Doping and Nanostructuring Liwen Wan; Lawrence Berkeley National Lab, United States.

9:00 AM *ES3.3.04
Activating Layered LiNi$_{1/3}$Co$_{1/3}$Mn$_{1/3}$O$_{2}$ as a Host for Mg Intercalation in Rechargeable Mg Batteries Kisuk Kang; Seoul National University, Korea (the Republic of).
9:30 AM ES3.4.05
Systematic Electron Microscopy Study Investigating Mg Intercalation of Tunnel Structured $\text{V}_2\text{O}_5$ Polymorph Arrieta Mukherjee; University of Illinois at Chicago, United States.

9:45 AM BREAK

SESSION ES3.5: Mg Ion Batteries I
Session Chairs: Jordi Cabana and Rana Mohtadi
Wednesday Morning, April 19, 2017
PCC North, 200 Level, Room 226 A

10:15 AM *ES3.5.01
Rechargeable Magnesium Batteries—Advancements and Bottlenecks Rana Mohtadi; Toyota, United States.

10:45 AM ES3.5.02
Electrochemical Stability of Magnesium-Based Anodes for Batteries Jodie A. Yuwono; Monash University, Australia.

11:00 AM ES3.5.03
Nanostructure Cathode and Anode Materials for Mg-Ion Batteries Kostiantyn Kravchek; ETH Zurich, Laboratory of Inorganic Chemistry, Switzerland; Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland.

11:15 AM *ES3.5.04
Are Spinel Oxides Viable for the Reversible Intercalation of Divalent Ions? An Update Jordi Cabana; University of Illinois at Chicago, United States.

1:45 PM *ES3.6.01
Magnesium Sulfur Battery—Its Beginning and Recent Progress Maximilian Fichtner; Helmholtz Institute Ulm (HIU), Germany.

2:15 PM ES3.6.02
Multivalent Metal/Sulfur Chemistry for High Energy Density Rechargeable Battery Tao Gao; University of Maryland, United States.

2:30 PM BREAK

SESSION ES3.7: Anion Redox
Session Chairs: Alexis Grimaud and Naoki Yabuuchi
Wednesday Afternoon, April 19, 2017
PCC North, 200 Level, Room 226 A

3:30 PM *ES3.7.01
Anionic Redox Processes for Energy Storage—Mastering the O-O Bond Formation Alexis Grimaud; 1, 2 Collège de France, France; 3Centre National de la Recherche Scientifique, France.

4:00 PM ES3.7.02
A Joint Experimental and Theoretical Approach to the Question of Anion Redox in Lithium-Rich Layered Oxides William Gent; 1, 2 Stanford University, United States; 3Lawrence Berkeley National Laboratory, United States.

4:15 PM *ES3.7.03
Strong Oxygen Participation in the Redox Governing the Structural and Electrochemical Properties of Na-Rich Layered Oxide Na$_2$IrO$_3$ Arnaud J. Perez; 1, 2 Collège de France, France; 3Sorbonne Universités, France.

4:45 PM ES3.7.04
An Intermediate Temperature Solid Oxide Iron-Air Redox Battery Operated on O$^-$-Chemistry and Loaded with Pd-Catalyzed Iron-Based Energy Storage Material Kevin Huang; University of South Carolina, United States.

4:55 PM ES3.7.05
Regenerative Hydrogen Electrodes for Energy Storage Sanjeev Mukerjee; Northeastern University, United States.
1:45 PM ES3.9.02
Tuning the Interlayer of Transition Metal Oxides for High Rate and Multivalent Energy Storage Veronica Augustyn; North Carolina State University, United States.

2:00 PM ES3.9.03
Titanium Disulfide-Carbon Nanotube Electrodes Enable High Energy Density Pseudocapacitors Xining Zang 1, 2; 1University of California, Berkeley, United States; 2University of California, Berkeley, United States.

2:15 PM ES3.9.04
Complementary Electrochromic Supercapacitor for Multifunctional Smart Window Feichi Zhou; HK Polytechnic University, Hong Kong.

2:30 PM ES3.9.05
Direct Graphenic Nanocarbon Growth on Silicon for Miniaturised Supercapacitors Francesca Iacopi; University of Technology Sydney, Australia.

2:45 PM ES3.9.06
Fiber-Shaped Asymmetric Supercapacitors with Ultrahigh Energy Density for Flexible/Wearable Energy Storage Li Yong; University of Science and Technology Beijing, China.

3:00 PM BREAK

3:30 PM ES3.9.07
Direct Integration of an Anodic Molybdenum Trioxide Pseudocapacitor on a Screen-Printed Silicon Solar Cell for On-Module Energy Storage Shi Nee Lou; University of New South Wales, Australia.

3:45 PM ES3.9.08
Graphene-AgVO$_3$ Composite for Supercapacitor Applications Jiaqian Qin; Chulalongkorn University, Thailand.

4:00 PM ES3.9.09
Synthesis of Nickel Cobalt Sulfide@Holey Graphene Hydrogel for Supercapacitors Sintayehu N. Tiruneh; Sungkyunkwan University, Korea (the Republic of).

4:15 PM ES3.9.10
Role of Redox Additives in Inducing Three Times Higher Electrochemical Activity in Supercapacitors Based on Co$_3$O$_4$ Nanorods Md. Aqueel Akhtar; Indian Institute of Technology Kharagpur, India.

4:30 PM ES3.9.11
Design of Miura Folding Based Micro-Supercapacitor Arrays with Higher Areal Densities as Foldable and Miniaturized Energy Storage Units Bo Song; Georgia Institute of Technology, United States.