



Fundamental Tools for Designing the Next Generation of Electrochemical Energy Storage

February 21 - 26, 2016

Chair

Dean Wheeler

Vice Chair

Nina Balke

Four Points Sheraton / Holiday Inn Express

1050 Schooner Drive

Ventura, California, United States

Conference Description

Building on the successful GRC Batteries programs in 2012 and 2014, this meeting will continue the focus on fundamental understanding of the chemistry and physics that control battery performance, and using that knowledge to improve battery materials and designs. Analytical tools, particularly *in situ* and *in operando*, are becoming increasingly important in detecting and overcoming the root causes of battery materials failure. Modeling tools on multiple length scales complement these experimental efforts to decouple the complicated phenomena underlying materials and cell behavior. Nanoscale designs offer the hope of further increasing cell power and energy density. Based on feedback from the 2014 meeting, lessons from industrial battery development will also be included in the discussions.

We look forward to a stimulating meeting full of conversations and networking with international leaders in battery research. All attendees are invited to present a poster at one of the daily poster sessions. A Gordon Research Seminar for students and post-doctoral researchers precedes the meeting.

Related Meeting



This GRC will be held in conjunction with the "Batteries" Gordon Research Seminar (GRS). Those interested in attending both meetings must submit an application for the GRS in addition to an application for the GRC. Refer to the [associated GRS program page](#) for more information.

Conference Program

Sunday

4:00 pm - 8:00 pm	Arrival and Check-in
6:00 pm	Dinner
7:30 pm - 7:40 pm	Welcome / Introductory Comments by GRC Site Staff
7:40 pm - 9:30 pm	Lessons from Industry Discussion Leader: Shawn Litster (Carnegie Mellon University, USA)
7:40 pm - 8:20 pm	Mark Verbrugge (General Motors, USA) "Batteries for Vehicle Electrification: Where We Have Been and Where We Are Going"
8:20 pm - 8:35 pm	Discussion
8:35 pm - 9:15 pm	Thomas Barrera (The Boeing Company, USA) "Integrating Lessons Learned from Lithium Battery Faults in the Aerospace Industry"
9:15 pm - 9:30 pm	Discussion

Monday

7:30 am - 8:30 am	Breakfast
8:30 am	Group Photo
9:00 am - 12:30 pm	Nanoscale Materials Design

Discussion Leader: **Bryan McClosky** (University of California, Berkeley, USA)

- 9:00 am - 9:40 am **Yi Cui** (Stanford University, USA)
"Nanomaterials Design of Batteries Guided by *In-Operando* Characterization and Atomistic Simulation"
- 9:40 am - 10:00 am Discussion
- 10:00 am - 10:30 am Coffee Break
- 10:30 am - 11:10 am **Ying Shirley Meng** (University of California, San Diego, USA)
"Nanoscale Imaging of Alkali Metal Intercalation Materials for Rechargeable Batteries"
- 11:10 am - 11:30 am Discussion
- 11:30 am - 12:10 pm **Jeff Dahn** (Dalhousie University, Canada)
"Impedance Growth in Aged/Cycled Li-Ion Batteries"
- 12:10 pm - 12:30 pm Discussion
- 12:30 pm Lunch
- 1:30 pm - 4:00 pm Free Time
- 4:00 pm - 6:00 pm Poster Session
- 6:00 pm Dinner
- 7:30 pm - 9:30 pm **From Lithium to Sodium**
- Discussion Leader: **Candace Chan** (Arizona State University, USA)
- 7:30 pm - 8:10 pm **Juergen Janek** (Justus Liebig University of Giessen, Germany)
"Lithium-Oxygen and Lithium-Sulfur Cells vs. Their Sodium Analogs - What's Different?"
- 8:10 pm - 8:30 pm Discussion

8:30 pm - 9:10 pm **Linda Nazar** (University of Waterloo, Canada)
"Below Li-Ion: Positive Aspects of Sodium Batteries"

9:10 pm - 9:30 pm Discussion

Tuesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Interfaces and Interphases**

Discussion Leader: **Yue Qi** (Michigan State University, USA)

9:00 am - 9:40 am **Robert Kostecki** (Lawrence Berkeley National Laboratory, USA)
"Understanding Charge and Mass Transport Across Interfaces and Interphases in Rechargeable Batteries"

9:40 am - 10:00 am Discussion

10:00 am - 10:30 am Coffee Break

10:30 am - 11:10 am **Perla Balbuena** (Texas A&M University, USA)
"SEI Nucleation and Growth on Li-Ion and Li-Sulfur"

11:10 am - 11:30 am Discussion

11:30 am - 12:10 pm **Brian Sheldon** (Brown University, USA)
"Mechanical Behavior of SEI Films"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:30 pm - 9:30 pm

Fundamental Mechanisms Governing Battery Performance

Discussion Leader: **Won-Sub Yoon** (Sungkyunkwan University, South Korea)

7:30 pm - 8:10 pm

Doron Aurbach (Bar Ilan University, Israel)
"Fundamentals of Batteries"

8:10 pm - 8:30 pm

Discussion

8:30 pm - 9:10 pm

Rachid Yazami (Nanyang Technological University, Singapore)
"Thermodynamics as a Tool to Address Battery Fundamental Yet Still Open Questions"

9:10 pm - 9:30 pm

Discussion

Wednesday

7:30 am - 8:30 am

Breakfast

9:00 am - 12:30 pm

Tools for Studying Lifetime Phenomena

Discussion Leader: **Stephen Harris** (Lawrence Berkeley National Laboratory, USA)

9:00 am - 9:40 am

Daniel Abraham (Argonne National Laboratory, USA)
"Designing Long-Life High-Energy Lithium-Ion Cells"

9:40 am - 10:00 am

Discussion

10:00 am - 10:30 am

Coffee Break

10:30 am - 11:10 am

John Turner (Oak Ridge National Laboratory / UT-Battelle, USA)
"Mechanistic Simulation of Short-Circuits and Thermal Runaway Due to Mechanical Abuse"

11:10 am - 11:30 am

Discussion

11:30 am - 12:10 pm **Craig Carter** (Massachusetts Institute of Technology, USA)
"Mechanical Failure in Electrode Particles and at Solid Electrolyte Interfaces During Cycling"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:30 pm - 9:30 pm **Reducing the Cost per kWh**

Discussion Leader: **Corie Cobb** (PARC, a Xerox Company, USA)

7:30 pm - 8:10 pm **Linda Gaines** (Argonne National Laboratory, USA)
"Enabling Future Li-Ion Battery Recycling"

8:10 pm - 8:30 pm Discussion

8:30 pm - 9:10 pm **Dan Steingart** (Princeton University, USA)
"Negotiating with Batteries"

9:10 pm - 9:30 pm Discussion

Thursday

7:30 am - 8:30 am Breakfast

8:30 am - 9:00 am Business Meeting

Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair

9:00 am - 12:30 pm **New Chemistries**

Discussion Leader: **Haleh Ardebili** (University of Houston, USA)

9:00 am - 9:40 am	M. Stanley Whittingham (State University of New York at Binghamton, USA) "Two Li Redox Batteries as an Alternative to Mg"
9:40 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	Yukinori Koyama (National Institute for Materials Science, Japan) "Accelerated Materials Discovery Using DFT Calculation"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	Hector Abruna (Cornell University, USA) "Novel Materials, Architectures and <i>Operando</i> Methods in Electrical Energy Storage"
12:10 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<u>Poster Session</u>
6:00 pm	Dinner
7:30 pm - 9:30 pm	Battery Reformat
	Discussion Leader: Susan Odom (University of Kentucky, USA)
7:30 pm - 8:10 pm	Jeffery Read (U.S. Army Research Laboratory, USA) " <i>In-Situ</i> Studies of Anion Intercalation of Graphite for Energy Storage Applications"
8:10 pm - 8:30 pm	Discussion

8:30 pm - 9:10 pm **Fikile Brushett** (Massachusetts Institute of Technology, USA)
"Redox Flow Batteries"


9:10 pm - 9:30 pm Discussion

Friday

7:30 am - 8:30 am Breakfast

9:00 am Departure

Contributors

		
 		
		
The conference is also supported by Argonne National Laboratory.		