Advanced Energy Storage

scialog 2017®

First Annual Scialog Conference
November 2-5, 2017 at Westward Look Resort
Tucson, Arizona

RESEARCH CORPORATION
for SCIENCE ADVANCEMENT

Conference Objectives

Engage in dialog with the goal of accelerating high-risk/high-reward research.

Identify and analyze bottlenecks in advancing time domain astrophysics and develop approaches for breakthroughs.

Build a creative, better-networked community that is more likely to produce breakthroughs.

Form teams to write proposals to seed novel projects based on highly innovative ideas that emerge at the conference.

Conference Process

Brainstorming is welcome; don't be afraid to say what comes to mind.

Consider the possibility of unorthodox or unusual ideas without immediately dismissing them.

Discuss, build upon and even constructively criticize each other's ideas – in a spirit of cooperative give and take.

Make comments concise to avoid monopolizing the dialog.

From the President

Welcome to Research Corporation's **Scialog: Advanced Energy Storage meeting**. We expect this meeting will be the first of several on this topic.

The goal of this Scialog is to catalyze theorists, computational scientists, and experimentalists across multiple disciplines to collaborate on developing new and innovative projects to accelerate fundamental science to drive advances in energy storage.

Scialog's over-arching purpose is to help solve real-world problems of global significance by catalyzing innovative, basic research leading to fundamental discoveries. Our focus is on scientists in the early years of their independent careers. Through the unique Scialog process, we seek to lay the foundation for an ongoing, highly creative, cross-disciplinary community of energy scientists that will prove adept at identifying exciting areas for research advances.

To that end, under the guidance of Senior Program Directors **Richard Wiener** and **Silvia Ronco**, we hope you will be engaged in passionate discussions with colleagues, many of whom you will have met for the first time at this meeting. The process may even push you out of your comfort zone with the goal of stimulating new and better ideas. The result, we expect, will be a meeting unlike others that you attend. We are confident that you will find the next few days to be extremely worthwhile.

This is your opportunity to air that wild idea you have been reluctant to share with others, or to discuss a nagging hunch that does not yet have sufficient supporting data, or to take a leap on a high-impact/high-risk project instead of concentrating all your effort on somewhat more "incremental" studies. This is the time to come up with, and be open to, completely new ideas that may truly change the world.

We hope this first meeting on this topic yields a crop of outstanding team proposals, which will make our job of determining who receives funding very challenging. I wish you every success in exploring new and compelling ideas over the next few days.

Have a terrific meeting!

Daniel Linzer
President
Research Corporation for Science Advancement

From the Program Director

This year we are holding the first annual meeting of **Scialog: Advanced Energy Storage**. Research Corporation's highly interactive Scialog meetings have the goal of catalyzing new collaborations based on blue-sky ideas among Scialog Fellows who constitute a highly select group of exemplary early career U.S. scientists. The emphasis is on dialog, networking and building new collaborations to pursue novel high-risk discovery research. The initial meeting is always an exciting opportunity for Fellows to experience the unique aspects of Scialog for the first time.

Research Corporation chose to focus on advanced energy storage because we believe this critical area of science requires major breakthroughs in fundamental understanding of electrochemical and physical processes that will lead to a new era of technological advance. Just as firmly, we believe these breakthroughs can be accelerated by chemists, engineers, material scientists and physicists working collaboratively on novel, high-risk projects, particularly with theorists and experimentalists combining efforts.

We have three outstanding keynote speakers:

- **Héctor (Tito) Abruña**, Cornell University
- **Karl Mueller**, Pacific Northwest National Laboratory
- **Amy Prieto**, Colorado State University

We also have outstanding discussion facilitators, including **Sarbajit Banerjee**, Texas A&M University, **George Crabtree**, Argonne National Laboratory, **Bruce Dunn**, University of California, Los Angeles, **Nancy Haegel**, National Renewable Energy Laboratory, **Prashant Kamat**, University of Notre Dame, **Haresh Kamath**, Electric Power Research Institute, **Stan Whittingham**, Binghamton University, and **Yiying Wu**, Ohio State University, along with **Tito**, **Karl** and **Amy**.

Scialog conferences focus on dialog and team building with the goal of creating novel strategies and collaborative approaches. An important feature of Scialog meetings is the opportunity for Scialog Fellows to form teams and write proposals to pursue particularly creative ideas that emerge through the dialog. We hope this competition is exciting, but regardless of which proposals are funded, the purpose is to catalyze a deeper and more meaningful exchange of ideas than ordinarily occurs at scientific conferences. Our intent is for this process to facilitate participants gaining new insights and connections that significantly advance efforts to understand fundamental science to enable major advances in energy storage.

We hope each participant finds the Scialog experience of great value. Please do not hesitate to provide feedback on how to make the conference better. My fellow Senior Program Director, **Silvia Ronco**, the RCSA staff, and I are here to listen and to help make this a great experience for you!

Richard Wiener
Senior Program Director
Research Corporation for Science Advancement

Conference Agenda
Westward Look Resort
November 2-5, 2017

Thursday, November 2

1:00 pm	**Registration Opens**	Lobby
1:00 - 5:00 pm	**Snacks & Informal Discussions**	Palm Room & Terrace
5:00 - 6:30 pm	**Poster Session & Reception**	Sonoran Ballroom
6:00 - 6:30 pm	**Meeting for Discussion Facilitators**	Ocotillo & Cholla
6:30 - 7:30 pm	**Dinner**	Ocotillo & Cholla
7:15 - 7:30 pm	**Welcome** Dan Linzer, *President, RCSA*	Ocotillo & Cholla
7:30 - 7:45 pm	**Conference Overview, Desired Outcomes & Guidelines for Collaborative Proposals** Richard Wiener, *Senior Program Director, RCSA*	Ocotillo & Cholla
7:45 - 8:30 pm	**Keynote Presentation** Héctor Abruña, *Cornell University*	Ocotillo & Cholla
8:30 - 11:00 pm	**AES Starlight Café** Snacks, conversations, etc.	Palm Room & Terrace

Friday, November 3

7:00 - 8:00 am	**Breakfast**	Palm Room & Terrace
8:00 - 9:00 am	**Introductions**	Ocotillo & Cholla
9:00 - 9:45 am	**Keynote Presentation** Karl Mueller, *Pacific Northwest National Laboratory*	Ocotillo & Cholla
9:45 - 10:15 am	**Conference Photo & Break**	Palm Terrace
10:15 - 10:30 am	**Breakout Sessions Overview**	Ocotillo & Cholla
10:30 - 11:30 am	**Breakout Session I**	Ocotillo & Cholla*
11:30 am - 12:00 pm	**Report Out**	Ocotillo & Cholla
12:00 - 12:30 pm	**Mini Breakout Session I**	Ocotillo & Cholla*
12:30 - 1:30 pm	**Lunch**	Palm Room & Terrace
1:30 - 2:15 pm	**Keynote Presentation** Amy Prieto, *Colorado State University*	Ocotillo & Cholla
2:15 - 3:15 pm	**Breakout Session II**	Ocotillo & Cholla*
3:15 - 3:30 pm	**Report Out**	Ocotillo & Cholla
3:30 - 4:00 pm	**Mini Breakout Session II**	Ocotillo & Cholla*
4:00 - 5:30 pm	**Afternoon Break**	
5:30 - 6:30 pm	**Poster Session & Reception**	Sonoran Ballroom
6:30 - 7:30 pm	**Dinner**	Ocotillo & Cholla
7:15 - 8:00 pm	**Panel Discussion: Opportunities for Scialog Fellows**	Ocotillo & Cholla
8:00 - 11:00 pm	**AES Starlight Café** Snacks, Conversations, etc.	Palm Room & Terrace

Saturday, November 4

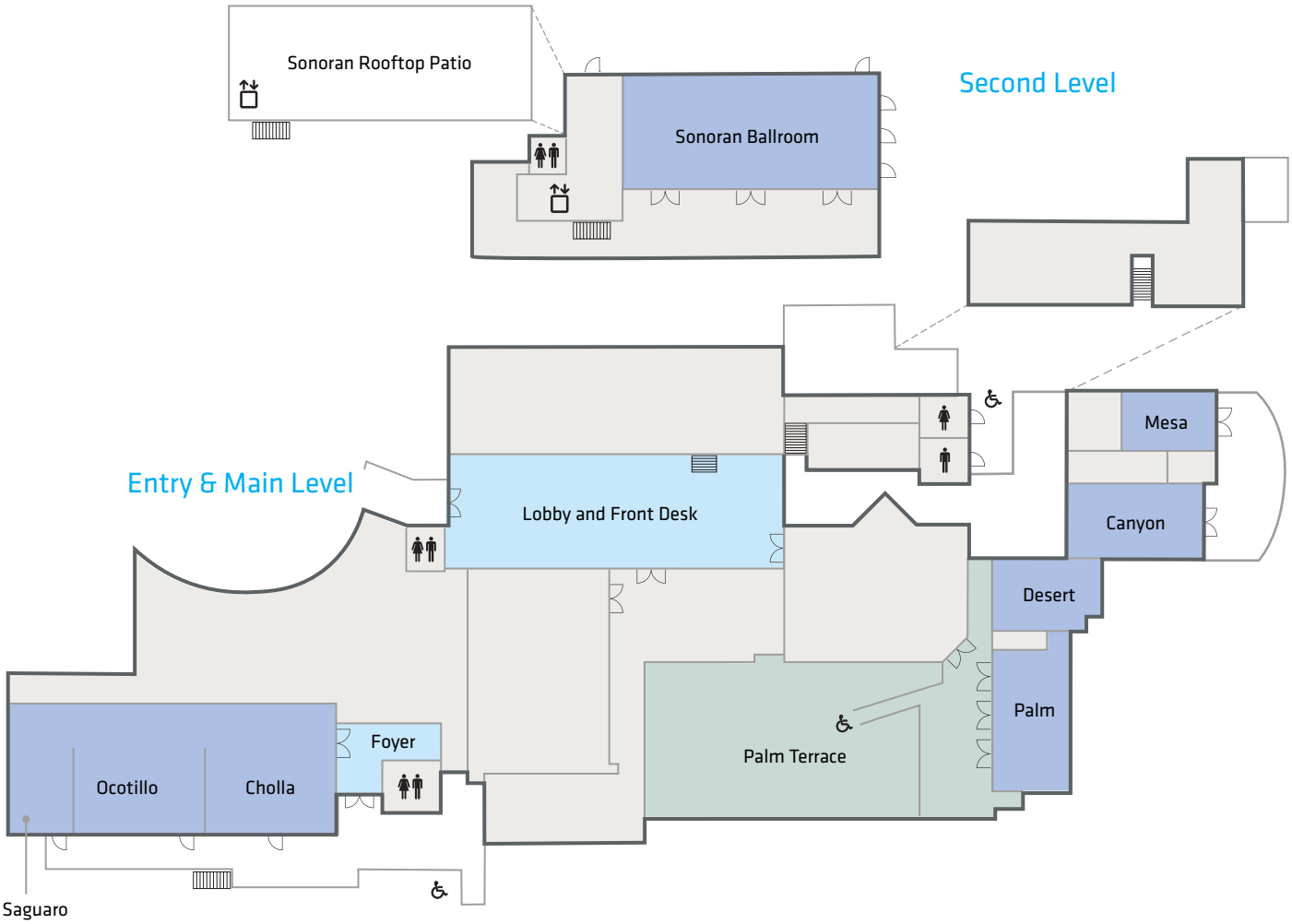
6:15 - 7:15 am	**Optional Guided Nature Walk**	WL Trails–Meet in Lobby
7:00 - 8:15 am	**Breakfast**	Palm Room & Terrace
8:15 - 9:15 am	**Breakout Session III**	Ocotillo & Cholla*
9:15 - 9:30 am	**Report Out**	Ocotillo & Cholla
9:30 - 10:00 am	**Mini Breakout Session III**	Ocotillo & Cholla*
10:00 - 10:30 am	**Morning Break**	
10:30 - 11:30 am	**Breakout Session IV**	Ocotillo & Cholla*
11:30 - 11:45 am	**Report Out**	Ocotillo & Cholla
11:45 am - 12:15 pm	**Mini Breakout Session IV**	Ocotillo & Cholla*
12:15 - 1:30 pm	**Lunch**	Palm Room & Terrace
1:30 - 6:00 pm	**Team Formation, Informal Discussion & Proposal Writing** Proposals due 7:00 am Sunday morning	
6:00 - 6:30 pm	**Reception**	Sonoran Ballroom
6:30 - 7:30 pm	**Dinner**	Ocotillo & Cholla
7:30 - 11:00 pm	**AES Starlight Café** Snacks, Conversations, etc.	Palm Room & Terrace

Sunday, November 5

7:00 - 8:00 am	**Breakfast**	Palm Room & Terrace
8:00 - 10:30 am	**Presentations of Proposal Ideas**	Ocotillo & Cholla
10:30 - 11:00 am	**Assessment Survey & Wrap-up**	Ocotillo & Cholla
11:00 am - 12:00 pm	**Lunch** Available to go	Saguaro Room

*Breakout Sessions will be held in Ocotillo & Cholla, Desert, Canyon, Mesa, and Saguaro meeting rooms. Fellows will first meet in Ocotillo and Cholla and then disperse to their discussion groups.

Westward Look Resort



Keynote Speakers

Challenges and Opportunities in Electrical Energy Storage

Héctor D. Abruña
Émile M. Chamot Professor of Chemistry
Cornell University

Abstract: This presentation will deal with challenges and opportunities in electrical energy storage technologies with emphasis on batteries, supercapacitors and redox flow batteries. We will focus on some of our recent work including the development of operando methods with emphasis on X-ray diffraction (XRD), X-ray absorption spectroscopy (XAS), X-ray microscopy and tomography and transmission electron microscopy (TEM) under active potential control. The utility of these methods will be illustrated by selected examples including organic materials, Li/S batteries and lithium dendrite formation dynamics. The use of operando TEM will be illustrated by exploring the lithiation/de-lithiation dynamics of $LiFePO_4$ via energy-filtered TEM. Finally the concept of symmetrical redox flow batteries will be introduced and demonstrated. The presentation will conclude with an assessment of future directions.

Bio: Professor Abruña, Émile M. Chamot Professor of Chemistry, is Director of the Energy Materials Center at Cornell (emc^2). He completed his graduate studies with Royce W. Murray and Thomas J. Meyer at the University of North Carolina at Chapel Hill in 1980 and was a postdoctoral research associate with Allen J. Bard at the University of Texas at Austin from 1980-81. After a brief stay at the University of Puerto Rico, he joined Cornell in 1983. He was Chair of the Department of Chemistry and Chemical Biology from 2004-2008.

Professor Abruña has been the recipient of numerous awards including a Presidential Young Investigator Award, A. P. Sloan Fellowship, J. S. Guggenheim Fellowship and J. W. Fulbright Senior Fellow. He is the recipient of the Electrochemistry Award for the American Chemical Society (2008), and the C.N. Reilley Award in Electrochemistry for 2007. He was elected Fellow of the American Association for the Advancement of Science in 2007, member of the American Academy of Arts and Sciences in 2007 and Fellow of the International Society of Electrochemistry in 2008. He received the D. C. Grahame Award from the Electrochemical Society for 2009, the Faraday Medal of the Royal Society for 2011, the Brian Conway Prize from the International Society of Electrochemistry for 2013, was named Fellow of the Electrochemical Society in 2013 and most recently (2017) was the recipient of the Gold Medal of the International Society of Electrochemistry. Prof. Abruña is the co-author of over 450 publications (h-index=80) and has given over 600 invited lectures worldwide. He considers his 52 Ph.D. students and 65 Post-Doctoral associates as his most important professional achievement

Keynote Speakers Continued

Characterizing the Chemistries of Operating Battery Systems: Current Art and Future Dreams

Karl Mueller
Chief Science and Technology Officer for Physical & Computational Sciences
Pacific Northwest National Laboratory

Abstract: The design and achievement of superior battery systems (i.e., those that are more efficient, higher in energy density, safer, more environmentally friendly, etc.) requires knowledge of fundamental chemical and physical properties of the system and its components while under true operating conditions. Such advanced knowledge can be obtained through both modeling and experimental efforts. In the case of battery systems designed to replace the well-known lithium ion battery systems, new chemistries in particular are being explored, classified, and improved using state-of-the-art characterization and computational tools. New analytical tools have been developed for the study of these advanced battery systems in destructive, post-mortem modes, as well as while the battery is under operating conditions. Further, certain aspects of the battery chemistry and operation can also be modeled and reproduced with varying degrees of fidelity through computational studies that cross scales from the atomic and molecular to the sizes of pores and beyond. The combination of these experimental techniques and computational tools will eventually lead to predictive understanding of battery components and their operation in the complete battery system. This presentation will focus on progress in merging operando studies utilizing advanced spectroscopies (NMR, EPR, x-ray, IR, etc.), in situ imaging (electron microscopy, XPS, etc.), and computational chemistry (especially ab initio and molecular dynamics simulations) to understand components of complex battery systems?

Bio: Karl Mueller is the Chief Science and Technology Officer for Physical and Computational Sciences at the Pacific Northwest National Laboratory (PNNL). Dr. Mueller is an internationally recognized expert in magnetic resonance spectroscopy and its application to complex materials and environmental systems. He is the PNNL lead for the Joint Center for Energy Storage Research (JCESR), a DOE Office of Science Energy Innovation Hub. Dr. Mueller was elected as a Fellow of the American Association for the Advancement of Science (AAAS) in 2012. He is also a Laboratory Fellow at PNNL, and the recipient of numerous awards including a National Science Foundation (NSF) Young Investigator Award, a Camille Dreyfus Teacher-Scholar Award, a Research Corporation Cottrell Scholar Award, and an Arnold and Mabel Beckman Foundation Young Investigator Award.

Dr. Mueller earned his Ph.D. in physical chemistry from the University of California at Berkeley and a BS in chemistry from the University of Rochester. He spent one year abroad (1985-1986) at Cambridge University as a Churchill Scholar. Prior to joining PNNL in 2010, he rose through the faculty ranks to become a Professor of Chemistry at Penn State University where he oversaw the thesis research of 25 doctoral students in the chemical sciences.

Keynote Speakers Continued

Inexpensive, Efficient Approaches for the Electrodeposition of High Energy Density Anodes for Rechargeable Batteries†

Amy Prieto
Professor, Department of Chemistry
Colorado State University

Abstract: I will discuss electrodeposited M-Sb (where M = Ni, Cu, Zn) thin films and nanowire arrays that have been investigated as alloy anodes for Li-ion batteries to elucidate the effects of both the film composition and substrate interactions on cycling stability and lifetime.[1,2] The results discussed will demonstrate that important composition and substrate factors for anode cycling performance are being developed that are likely applicable to other systems.[3] A key theme in this work is how to develop materials architectures that not only have attractive properties for the chosen application (energy storage), but that are also ideally suited to elucidating and understanding degradation mechanisms for high energy density materials. I will also discuss my opinions on the need for integrating a big-picture view of manufacturability for applied materials research, as well as the challenges and opportunities in moving research and development from an academic lab into the marketplace.

Bio: Dr. Prieto is a Professor in the Department of Chemistry at Colorado State University. In addition to her research in Li-ion batteries, she has active projects developing nanoparticles inks for photovoltaics, light metal nanoparticles for hydrogen storage, and novel nanowire structures. She earned a Ph.D. in Inorganic Chemistry from the University of California, Berkeley, as a Cooperative Research Fellow supported by Bell Labs. Her postdoctoral work was performed at Harvard University where she was named a L'Oréal USA for Women in Science Fellow. Prof. Prieto founded Prieto Battery, Inc. in 2009. In 2011 she was named the ExxonMobil Solid State Chemistry Faculty Fellow (an American Chemical Society award), a Presidential Early Career Awardee for Scientists and Engineers (PECASE) and won the Excellence in Storage Technology Commercialization Award from the Colorado Cleantech Industry Association. In 2014 she received the Agnes Fay Morgan Research Award from Iota Sigma Pi. She is a previous Scialog Fellow, an Associate Editor for Chemical Communications, and has recently been inducted as a Fellow of the Royal Society of Chemistry. Her batteries are currently on display at the Smithsonian Institute, Lemelson Center in the "Places of Invention" exhibit.

†Authors: Leslie Kraynak, Jeffrey Ma, Maxwell C. Schulze and Amy L. Prieto–Department of Chemistry, Colorado State University

1) E. D. Jackson, J. M. Mosby, and A. L. Prieto. "Evaluation of the Electrochemical Properties of Crystalline Copper Antimonide Thin Film Anodes for Lithium Ion Batteries Produced by Single Step Electrodeposition" Electrochimica Acta, 2016, 214, 253-264.

2) E. D. Jackson, A. L. Prieto. "Copper Antimonide Nanowire Array Lithium Ion Anodes Stabilized by Electrolyte Additives", ACS Appl. Mater. Interfaces, 2016, 8 (44), pp 30379–30386.

3) E. D. Jackson, S. Green, and A.L. Prieto "Electrochemical Performance of Electrodeposited Zn_4Sb_3 Films for Sodium-Ion Secondary Battery Anodes" ACS Appl. Mater. Interfaces, 2015, 7(14) 7447-7450*

2017 Proposal Guidelines & Collaborative Awards

Scialog: Advanced Energy Storage

1. Awards are intended to provide seed funding for teams of two to three Scialog Fellows formed at this conference for novel out-of-the-box, cutting-edge and potentially high-impact projects.
2. Two-page proposals should describe the proposed project and the role of each team member. No budget is necessary. A third page may be used for references.
3. Awards will be in the amount of $100K direct funding for one year and divided between team members according to the team's preference.
4. No Scialog Fellow can be a member of more than two teams. If a Scialog Fellow is a member of two teams, other members of the two teams must be different. No team can submit more than one proposal.
5. No Scialog Fellow who previously has won a Scialog Collaborative Award can be a member of more than one team. The other team members must be different from the members of the previously awarded team. (Applicable in Year 2)
6. No Scialog Fellow who has won two Scialog Collaborative Awards can be a member of a team. (Applicable in Year 2)
7. Teams cannot include members who have previously collaborated with one another.
8. Teams are encouraged (but not required) to:
   a) Include at least one theorist or computational scientist and one experimentalist.
   b) Include members from different disciplines.
9. Proposals must be submitted electronically by Sunday morning at 7:00 am to RCSA Senior Program Directors Silvia Ronco (sronco@rescorp.org) and Richard Wiener (rwiener@rescorp.org).
10. Awards will be announced in 2017 and start at the beginning of 2018.

Scialog Fellows

Nandini Ananth ananth@cornell.edu
Cornell University
We develop and use theoretical simulation methods to understand reaction mechanisms and design novel charge and energy transfer materials.

Shane Ardo ardo@uci.edu
University of California, Irvine
My research interests are driven by the pursuit of understanding and controlling energy-conversion mechanisms in electrochemical devices.

Veronica Augustyn vaugust@ncsu.edu
North Carolina State University
Electrochemistry of materials including energy storage mechanisms, interfacial charge transfer, & diffusion in nanoconfined liquids.

Robert Berger robert.berger@wwu.edu
Western Washington University
I use Density Functional Theory (DFT) to study relationships between crystal and electronic structure in solids, particularly perovskites.

Fikile Brushett brushett@mit.edu
Massachusetts Institute of Technology
I'm interested in the science and engineering of electrochemical energy systems such as redox flow batteries and electrolyzers.

Jordi Cabana jcabana@uic.edu
University of Illinois at Chicago
Physical and inorganic electrochemistry of materials, combining approaches from classical solid state chemistry with nanoscience.

Candace Chan candace.chan@asu.edu
Arizona State University
Synthesis and characterization of nanostructured and novel materials.

Zheng Chen zhc199@ucsd.edu
University of California, San Diego
I am an experimentalist interested in design, synthesis, and understanding of nanomaterials and polymers for energy storage.

Anne Co co.5@osu.edu
Ohio State University
Electrochemistry, energy storage, Li transport by neutron activation, deconvoluting chemical processes.

Jahan Dawlaty dawlaty@usc.edu
University of Southern California
We study fundamental properties of electrochemical interfaces using tools of vibrational spectroscopy.

Daniel Esposito de2300@columbia.edu
Columbia University
Dan's interests include electrocatalysis, photoelectrochemistry, and the use of in situ analytical tools for imaging at small length scales.

Zhenxing Feng zhenxing.feng@oregonstate.edu
Oregon State University
Surface science, particularly using in-situ real-time synchrotron X-ray techniques to study the interfacial processes at energy devices.

Brett Fors brettfors@cornell.edu
Cornell University
The Fors Group explores the design and synthesis of organic polymeric materials for battery and super capacitor applications.

Nathaniel Gabor nathaniel.gabor@ucr.edu
University of California, Riverside
The Quantum Materials OptoE Lab studies 2D materials for next-generation energy harvesting and storage.

Puja Goyal goyalp@illinois.edu
Binghamton University
Biomimetic electrocatalysts for oxygen reduction in PEMFCs, the proton exchange membrane in PEMFCs and more efficient organic batteries.

Beth Guiton beth.guiton@uky.edu
University of Kentucky
In-situ high resolution electron microscopy, to gain understanding of phase transformations and atomic transport in inorganic nanomaterials.

Anthony Shoji Hall shoji@jhu.edu
John Hopkins University
The Hall Group investigates chemical reactions catalyzed by atomically-defined materials to address problems in renewable energy.

Kelsey Hatzell kelsey.b.hatzell@vanderbilt.edu
Vanderbilt University
Materials processing of solid electrolytes and in-situ characterization solid|solid interfaces.

Scialog Fellows Continued

Aaron Holder aaron.holder@colorado.edu
University of Colorado, Boulder
My research focuses on new predictive theory and in silico design of materials, chemistries and mechanisms for energy generation and storage.

Yan-Yan Hu hu@chem.fsu.edu
Florida State University
Solid-state batteries, NMR, and MRI, in situ and in operando characterizations.

Geoffrey Hutchison geoffh@pitt.edu
University of Pittsburgh
Rapid computationally-driven design of molecular materials, including photovoltaic, dielectric, and piezoelectric polymers + thin films. We combine theory and experiment.

David (Xiulei) Ji david.ji@oregonstate.edu
Oregon State University
We push the boundaries of materials chemistry for ion storage in solids for the purposes of sustainable energy storage.

Kristie Koski koski@ucdavis.edu
University of California, Davis
2D Layered Materials–Zero Valent Intercalation.

Kah Chun Lau kahchun.lau@csun.edu
California State University, Northridge
Beyond Li-ion battery (metal-O2, Li-S), solid@liquid@gas interfaces, novel or nano materials design/characterization simulation.

Zheng Li zhengli@vt.edu
Virginia Tech
Direct lithium-ion battery recycling through fundamental understanding of materials degradation and electrochemical process.

Tianbiao (Leo) Liu leo.liu@usu.edu
Utah State University
Our battery research focuses on redox flow batteries and metal ion batteries beyond Li ion.

Michael Marshak michael.marshak@colorado.edu
University of Colorado, Boulder
Aqueous quinone batteries for home energy storage.

Bryan McCloskey bmcclosk@berkeley.edu
University of California, Berkeley
Charge transport in electrochemical systems.

Matthew McDowell mattmcdowell@gatech.edu
Georgia Tech
My group is focused on understanding and controlling dynamic processes and reaction mechanisms in electrochemical materials.

James McKone jmckone@pitt.edu
University of Pittsburgh
Electrochemistry and materials research related to energy conversion and storage: batteries, electrocatalysis, and photo-electrochemistry.

Brent Melot melot@usc.edu
University of Southern California
Developing structure-property relationships for the design of functional inorganic materials.

Rohan Mishra rmishra@wustl.edu
Washington University at St. Louis
Develop quantitative structure-property correlations in materials using electronic structure calculations and electron microscopy.

Partha Mukherjee pmukherjee@purdue.edu
Texas A&M University
Mesoscale computational physics and stochastics in energy storage.

James Neilson james.neilson@colostate.edu
Colorado State University
Materials by design: kinetic control of solid state chemistry (reaction-by-design) and structure property relations in functional materials.

Susan Odom susan.odom@uky.edu
University of Kentucky
Studying structure/property relationships to guide the design of improved organic materials for electrochemical energy storage applications.

Shyue Ping Ong ongsp@ucsd.edu
University of California, San Diego
Application of first principle calculations and informatics to accelerate materials design, including energy storage applications.

Julien Panetier panetier@binghamton.edu
Binghamton University
We use computational chemistry to design novel catalysts for the conversion of solar energy to fuels, and the activation of small molecules.

Scialog Fellows Continued

Louis Piper lpiper@binghamton.edu
Binghamton University
X-ray spectroscopy of functional metal oxides.

Ekaterina Pomerantseva epomeran@coe.drexel.edu
Drexel University
Focusing on (electro) chemistry of intercalation processes in transition metal compounds to synthesize new materials for energy applications.

Farshid Ramezanipour
farshid.ramezanipour@louisville.edu
University of Louisville
Inorganic Solid-State Chemistry, Material Design, Synthesis, Investigation of New Materials for Energy Storage Systems.

Christopher Rhodes cpr34@txstate.edu
Texas State University
Multivalent cathode materials, 2D and layered materials, inorganic-polymer nanocomposites, surface stabilization, Raman spectroscopy.

Joaquín Rodríguez-López joaquinr@illinois.edu
University of Illinois Urbana-Champaign
We use electrochemical microscopy to interrogate ionic and redox reactivity in electrocatalysts, battery interfaces and novel redox polymers.

Emily Ryan ryanem@bu.edu
Boston University
Computational modeling of reactive transport in multiphase, multiscale systems including batteries, fuel cells, CO2 capture, fuel injectors.

Kimberly See ksee@caltech.edu
California Institution of Technology
We probe and exploit the structure-property relationships of electrodes, electrolytes, and their interfaces in next-gen battery systems.

Natalia Shustova shustova@sc.edu
University of South Carolina
The focus of the Shustova Group is porous, well-defined, metal-organic materials for optoelectronic devices and porous electrodes.

Vladan Stevanovic vstevano@mines.edu
Colorado School of Mines
Discovery of novel functional materials for energy applications.

Yogesh (Yogi) Surendranath yogi@mit.edu
Massachusetts Institute of Technology
The Surendranath Group aims to use electricity to rearrange chemical bonds by controlling interfacial reactivity at the molecular level.

Sara Thoi sarathoi@jhu.edu
John Hopkins University
Porous materials for energy conversion and storage: small molecule activation, energy catalysis, and sulfur-based batteries.

Fernando Uribe-Romo fernando@ucf.edu
Central Florida University
My research focuses on the design and synthesis of framework materials for efficient use of energy.

Jesus Velazquez jevelazquez@ucdavis.edu
University of California, Davis
Synthesis, characterization, and development of systematic structure function correlations of cathode materials for multivalent batteries.

Aleksandra Vojvodic alevoj@seas.upenn.edu
University of Pennsylvania
Computational-driven materials design for chemical transformations and energy conversion with the focus on transition metal compounds.

Hailiang Wang hailiang.wang@yale.edu
Yale University
Surface chemistry and materials design for electrocatalytic chemical reactions and high-energy rechargeable battery technologies.

Scott Warren sw@unc.edu
University of North Carolina at Chapel Hill
I develop new layered and 2D solids and explore secondary batteries with anion shuttles.

Luisa Whittaker-Brooks
lwhittaker@chem.utah.edu
University of Utah
Deep understanding of chemical processes and ion-migration in energy storage materials and devices via in situ and in operando techniques.

Adam Willard awillard@mit.edu
Massachusetts Institute of Technology
Modeling the properties of driven electrochemical interfaces.

Scialog Fellows Continued

Hui (Claire) Xiong clairexiong@boisestate.edu
Boise State University

Synthesis and characterization of advanced nanostructured energy materials.

Jenny Yang j.yang@uci.edu
University of California, Irvine

Electrocatalysis for chemical fuel generation and utilization with a focus on molecular thermochemistry (i.e. bond strengths) and mechanism.

Yuan Yang yy2664@columbia.edu
Columbia University

Characterization and Fabrication of Solid State Batteries, Li-S Batteries. Ion transport in electrochemical systems.

Yan Yao yyao4@uh.edu
University of Houston

An experimentalist with research interests on magnesium batteries, aqueous batteries, and solid state batteries.

Iryna Zenyuk iryna.zenyuk@tufts.edu
Tufts University

I am interested in studying interaction of transport and morphology in energy conversion and storage devices by X-ray computed tomography.

Discussion Facilitators

Héctor Abruña hda1@cornell.edu
Cornell University
The Abruña Group focuses on the development and characterization of new materials and operando methods for fuel cells and batteries.

Sarbajit Banerjee banerjee@chem.tamu.edu
Texas A&M University
Electronic structure and instabilities, phase transitions, core-level spectroscopy, and transport phenomena.

George Crabtree crabtree@anl.gov
Argonne National Laboratory
JCESR creates fundamental knowledge on the materials and phenomena for beyond Li-ion batteries with transformational performance and cost

Bruce Dunn bdunn@ucla.edu
University of California, Los Angeles
Electrochemical energy storage; materials synthesis and characterization.

Nancy Haegel nancy.haegel@nrel.gov
National Renewable Energy Laboratory
Energy transport with near-field dual probe imaging, multiscale and multimodal characterization, materials science for renewable energy.

Prashant Kamat pkamat@nd.edu
University of Notre Dame
Basic research in Nano structured assemblies for energy conversion and storage.

Haresh Kamath hkamath@epri.com
Electric Power Research Institute

Karl Mueller karl.mueller@pnnl.gov
Pacific Northwest National Laboratory
Design and probing of battery materials and interfaces using novel characterization methods such as multimodal imaging and spectroscopies.

Amy Prieto amy.prieto@colostate.edu
Colorado State University
New architectures for rechargeable batteries with an eye toward manufacturability and enhanced performance.

Yiying Wu wu@chemistry.ohio-state.edu
Ohio State University
I am interested in materials chemistry for energy conversion and storage.

Stan Whittingham stanwhit@binghamton.edu
Binghamton University
Ion transport in solids particularly as related to lithium.

Guest

Ruby Barcklay rbarcklay@sciphil.org
Science Philanthropy Alliance
Interested in basic science opportunities to share with funders of climate and energy science.

Research Corporation Scientific Staff

Dan Linzer
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