



## Advances, Challenges, and Long-Term Opportunities of Electrochemistry: Addressing Societal Needs

### DAY 1 November 18, 2019 National Academy of Sciences Building

8:30 AM      **Welcome and Opening Remarks**

Ellen Mantus  
Director, Chemical Sciences Roundtable

8:40 AM      **Electrochemistry: Past, Present, and Future**

Larry Faulkner  
University of Texas, Austin

#### **Session 1: Applications of Electrochemistry**

##### ***Energy Storage***

***Moderator: Héctor Abruña, Cornell University***

9:10 AM      Multivalent Systems: The New Frontier in Battery Research  
Stanley Whittingham  
Binghamton University

9:40 AM      Peering into Batteries: Electrochemical Insight through Operando Methods  
Esther Takeuchi  
Stony Brook University

10:10 AM      Applications and Fundamentals of Electrochemical Capacitors  
Veronica Augustyn  
NC State University

10:40      *Break/Mingle*



***Energy Conversion***

***Moderator: Anne Co, The Ohio State University***

- 11:00 AM     Electrocatalysis for Sustainable Energy Conversion: Transferring Protons and Electrons at Solid-Liquid Interfaces  
Marc Koper via Videoconference  
Leiden University
- 11:30 AM     Simulating Materials for Energy Conversion and Storage from First Principles  
Ismaila Dabo  
Penn State University
- 12:00 PM     Designing New Catalysts and Processes for the Sustainable Production of Fuels and Chemicals  
Thomas Jaramillo  
Stanford University
- 12:30 PM     **LUNCH BREAK**

***Electrosynthesis***

***Moderator: Phil Baran, The Scripps Research Institute***

- 1:30 PM     Making Synthetic Organic Electrochemistry Mainstream  
Phil Baran  
The Scripps Research Institute
- 2:00 PM     New Catalytic Strategies for Selective Organic Electrosynthesis  
Song Lin  
Cornell University
- 2:30 PM     From Molecules to Molecular Surfaces: Exploiting the Synergy Between Organic Synthesis and Electrochemistry  
Kevin Moeller  
Washington University in St. Louis
- 3:00 PM     *Break/Mingle*
- 3:30- 5:00     **Session II – Educational, Resource, and Other Needs to Advance Electrochemical Science and Applications**

Moderators: Phil Baran, The Scripps Research Institute; Yet-Ming Chiang, MIT



*Panelists – Jeffrey Dick (University of North Carolina), Thomas Jaramillo (Stanford University), Shelley Minteer (University of Utah), Andrew Rappe (University of Pennsylvania), Esther Takeuchi (Stony Brook University), Bill Tumas (National Renewable Energy Laboratory)*

5:00 PM      **Adjourn Day 1**

**DAY 2**  
**November 19, 2019**  
**National Academy of Sciences Building**

**8:30            Introduction to Day 2**

Ellen Mantus  
Director, Chemical Sciences Roundtable

**Session III: Electrochemical Applications on the Horizon**

***Moderators: Raul Miranda, DOE; Carol Bessel, NSF***

8:40 AM      Next Generation Applications of Bioelectrochemistry  
Shelley Minteer  
University of Utah

9:10 AM      Seeing Electrochemistry Live at the Atomic Scale  
David Muller  
Cornell University

9:40 AM      Engineering Electrochemical Manufacturing: From high-performing reactors to separation processes  
Miguel Modestino  
New York University

10:10 AM     Integrating Data Science Tools into Molecular Design in Electrocatalysis and Energy Applications  
Matt Sigman  
University of Utah

10:40 AM     *Break/Mingle*



CHEMICAL SCIENCES ROUNDTABLE

- 11:00 AM     Single Entity Electrochemistry: Reaching the Ultimate Sensitivity in Measurement Science  
Jeffrey Dick  
University of North Carolina, Chapel Hill
- 11:30 AM     Electrification and Decarbonization of Chemical Synthesis  
Karthish Manthiram  
MIT
- 12:00 PM     **Closing Remarks**  
  
Carol Bessel  
NSF
- 12:15 PM     **Workshop Concludes**