

UCSD NANOENGINEERING/CHEMICAL ENGINEERING  
**SPECIAL SEMINAR**

March 2nd 2020

Seminar Presentation: 2PM-3PM

**SME room 248*****“Understanding and Design of Materials for High Energy Density Batteries”*****Jeffrey Lopez***Postdoctoral Associate  
Massachusetts Institute of Technology*

**Abstract:** Environmental challenges and economic forces are reshaping the way we generate and consume energy on a global scale. To keep up with the accelerating adoption of electric vehicles, allow for grid scale energy storage, and meet the demands of future technological advances, new materials for high energy density batteries must be developed. Strategies to enhance the mechanical and chemical stability of next-generation electrode materials are key to the successful and safe integration of batteries into our future energy systems. In this presentation, I will discuss new materials designed to address issues of stability in Li-ion batteries and fundamental insight into the mechanisms of this stabilization. The first portion of my talk will describe how a supramolecular, hydrogen-bonding self-healing polymer is used to stabilize high capacity anode materials. Second, I will describe further investigation toward a general understanding of how polymer coatings affect the electrodeposition of metallic lithium anodes. Overall, the goal of this work is to contribute new materials to be used in electric vehicles, grid scale storage, and new electronic devices, and to use these materials to develop fundamental understanding to provide direction for future materials design and improved stabilization of advanced battery chemistries.

**Educational development and training:** This seminar will provide a broad perspective on our changing energy infrastructure and the role that energy storage will play in this transition. Furthermore, the talk will discuss the processes of developing new materials and identifying impactful fundamental studies to pursue.

**Biosketch:** Jeffrey Lopez earned his Ph.D. in 2018 from Stanford University under the supervision of Prof. Zhenan Bao. He was awarded a NSF Graduate Research Fellowship and a NDSEG Fellowship to fund his graduate work, which focused on molecular design of new self-healing polymers and elastomers with novel mechanical properties for improving the stability of lithium ion batteries. Jeffrey is currently an Intelligence Community Postdoctoral Fellow at the Massachusetts Institute of Technology working with Prof. Yang Shao-Horn where he is studying fundamental mechanisms of electrochemical instability and ion transport in polymer electrolyte materials.

Jeffrey has received multiple awards for his research including the ACS Eastman Chemical Student Award in Applied Polymer Science in 2018 and the AIChE Excellence in Graduate Polymer Research Award 1st Prize in 2016. Jeffrey was involved with the Stanford Polymer Collective as President from 2013-2016 supporting the polymer research community on Stanford's campus, and has worked with various programs at Stanford and MIT to promote improved access to higher education among students from underrepresented minority groups.