PRINCETON
Mechanical & Aerospace Engineering

**Thursday, March 7th**

**12:30 pm EQUAD Rm J223**


# Jie Zhao

## Northwestern University


# Interfacial materials for electrochemical and biomedical devices


Interfaces play a key role in many areas including electronics, energy conversion and storage, and medical technology. In this talk, I will first introduce the development of interfacial materials for electrochemical devices such as batteries. The significant increase in energy density of batteries must be achieved by exploring new materials and cell configurations. Lithium metal and lithiated silicon are two promising high-capacity Li-containing anodes. Unfortunately, both these anodes suffer from serious environmental corrosion during electrode fabrication and battery cycling processes. The interfacial materials with precise atomic compositions and tailored nanostructures realize Li-containing anodes with both environmental and electrochemical stability. The interfacial engineering approaches bring huge benefit to both the existing Li-ion batteries and next-generation Li-S batteries.

In the second part, I will introduce the design of interfacial materials for transient electronics. Aside from environmental benefits, transient electronics find tremendous applications as bioresorbable implantable medical devices that obviate the need for extraction surgeries. The key challenge of bioresorbable electronics is to develop stable interfacial materials that can provide high-performance operation yet are completely dissolvable in biofluids and are fully biocompatible. By synthesizing barrier materials with optimized physical, chemical and mechanical properties, we developed biodegradable and wireless electronics with necessary operating times for therapeutic purposes, specifically as electrical stimulators to accelerate tissue regeneration.


Dr. Jie Zhao is currently a postdoctoral scholar with Prof. John A. Rogers in the Center for Bio-Integrated Electronics (CBIE) at Northwestern University. Jie obtained her B.S. degree in chemistry from Zhejiang University and earned the prestigious Evonik Degussa (Germany) Scholarship for Outstanding Students. Jie obtained her Ph.D. degree in materials science and engineering from Stanford University under the advice of Prof. Yi Cui. Her research has involved fundamental studies of chemical and biological interfaces, design and synthesis of novel materials with tailored nanostructures, and the development of high-performance energy storage systems and flexible biomedical devices. Her research about energy storage was recognized as U.S. DRIVE Highlights of Technical Accomplishments, 2015. She is the recipient of the MRS Graduate Student Award, 2017 and the Chinese Government Award for Outstanding Self-Financed Students Abroad, 2017.