Chemical Engineering Colloquium

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Goddard Hall, Room 227

12:00 PM – 1:00 PM

Intercalation Chemistry for Rechargeable Ion Batteries

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Rechargeable ion batteries, such as Li-ion batteries, are important energy storage devices that enable the clean energy revolution. Underpinning the success of rechargeable batteries is the intercalation chemistry, where charged ions reversibly insert into the vacancies of a host lattice accompanied by a redox reaction. However, the growing demand for batteries of higher energy density and lower cost poses significant challenges to realizing reversible ion intercalation. The high operating voltage necessary to increase the energy density often induces side reactions that undermine the reversibility of the intercalation reaction, and extending the intercalation concept to cheaper alternatives (e.g., Na/Zn/Ca ions) poses new challenges. In this talk, I first show our recent efforts through surface modification to address the cathode degradation at high operating voltages for Li-ion batteries. In the second part of the talk, I will focus on the intercalation chemistry for Na/Ca/Zn-ion batteries, where structural investigation is critical to understanding the reaction mechanism.

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