

MIT Chemical Engineering Department

Spring 2021 Seminar Series

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**Materials Design and Electrochemical
Engineering
at the Energy-Environment Nexus:
*from High Energy Density
Battery to Carbon Capture***



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Thursday, February 25, 2021
4:00-5:00PM

Abstract: The realization of a sustainable future necessitates effective electrochemical energy storage and utilization technologies. In the first part of my talk, I will describe my efforts in tackling the challenges of metallic lithium anode, which is the ultimate battery chemistry due to its highest theoretical capacity. I will discuss a key failure mechanism of lithium metal anode and the corresponding material design strategies to improve its performance metrics. In the second part of my talk, an electrochemically-mediated carbon capture technique will be introduced, which relies on redox-active compounds that undergo changes in their carbon dioxide binding affinity as they progress through an electrochemical cycle. By leveraging the electrolyte formulation, the process can be carried out with high reversibility in aqueous solutions. Through integration with a novel gas-gating membrane, a continuous separation operation can be achieved for process intensification, bringing new opportunities to acid gas separation.