

Materials Science and Materials Chemistry for Large-Scale Electrochemical Energy Storage

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This talk aims to discuss important cross-cutting, fundamental materials science and materials chemistry challenges that are applicable to a range of technologies encountered in electrochemical storage. This talk will attempt to highlight the critical materials problems using specific examples and results from recent efforts to reduce the cost and improve the performance of electrochemical energy storage devices. Specifically, this talk discusses 1) the characterization and understanding of the complex solution chemistry and redox reactions in concentrated, aggressive electrolyte solutions, 2) approaches to develop new battery designs and new chemistry combinations to reduce the cost, and 3) limitations and challenges of the electrode materials, nanoporous materials and ion selective membranes. In addition, the paper discusses the prospect of emergent technologies with ultralow costs on new energy storage materials and mechanisms.