Keynote speaker

Nanoscale Materials Synthesis for Sustainable Energy Applications

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With the global need for alternative energy and fuels, there is strong interest in the development of more efficient energy conversion and storage technologies. The requirements to achieve these energy conversion processes with high efficiency has motivated the need to synthesize materials at the nanoscale. Among the many synthetic strategies that are being applied to create these nanoscale components, atomic layer deposition (ALD), a technique widely used for making computer chips, has now emerged as one of the most exciting tools for the study, design, and fabrication of energy materials with improved properties and performance. This talk will describe our research applying ALD to the study of energy conversion devices, including both catalysts and lithium metal batteries. We show that nanoscale films deposited by ALD on lithium battery electrodes can enable uniform and reversible Li plating, leading to improvements in battery cyclability. For catalysts used in chemical conversion, we show that atomically-precise ALD titration of additive components onto supported metal catalysts allows for the tuning of activity and selectivity and provides new insights into structure-property relationships in these systems. The outlook for ALD to synthesize nanoscale materials and engineer interfaces for sustainable energy applications will be discussed.