Physics of Energy Storage Materials

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Energy storage is a cross-cutting topic that impacts applications ranging from transportation and portable electronics to large-scale (grid-based) storage for intermittent, renewable power sources. As the properties of energy storage devices depend critically upon the active materials from which they are constituted, improvements in capacity and power density hinge upon achieving a comprehensive understanding of the underlying materials physics and chemistry. Towards this goal, this Focus Topic will broadly cover the physics of energy storage materials. Specific topics of interest include, but are not limited to: advanced lithium-ion and metal-air batteries; hydrogen storage; supercapacitors; catalytic phenemonena in energy storage; nanostructured materials; intercalation and insertion compounds; ionic and electronic conductive polymers; novel synthesis methods; recent advances in real-time or *in situ* characterization techniques; and computational approaches ranging from *ab initio* calculations to mesoscale and continuum modeling. Of particular interest are studies which elucidate performance-limiting phenomena or which describe novel compounds or synthetic approaches aimed at overcoming these limitations.