

Special Issue

Metal Hydrides and Oxyhydrides for Energy-Related Applications

Message from the Guest Editors

Metal hydrides have become widely studied as solid-state hydrogen-storage media due to their exceptionally high gravimetric and volumetric hydrogen densities, the latter often suppressing that of liquid hydrogen. At the same time, the volumetric energy density of a hydrogen medium can be higher than that of any other materials, including Li-batteries. Whereas particular hydride classes or compounds possess one or several of the key properties for a hydrogen storage material—and find niche applications—none of them has it all.

Contrarily to hydrides, the field of metal oxyhydrides is rather unexplored, presenting a new horizon of challenges and opportunities. Introduction of H[−] into an oxide can tune binding energy and electronic structure, altering the local symmetry and causing crystal field splitting, changing bonding nature, etc. This can induce unique structural and chemico-physical properties in the materials, including H[−] conductivity, photochromism, photoelectrochemical water splitting, electrical conductivity, and catalytic properties. Around 50 oxyhydride compounds are currently known to possess unique and interesting properties...

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