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Metal hydrides for lithium-ion battery application: A review

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ABSTRACT

The state of the art of energy storage and conversion is still unfulfilled application for lithium-ion devices, which require high energy density and superior safety. The development of innovative electrode materials with excellent electrochemical performances is supposed to be the only way to satisfy the diversified and extended application of lithium-ion batteries (LIBs). As anode electrode materials, the active materials of classical intercalation reaction (i.e. graphite) and alloying have been investigated for many years. However, the relative low theoretical capacities and capacity fading limit their application in the next-generation LIBs. Recently, the conversion materials, especially metal hydrides, have been demonstrated to be attractive anode materials for LIBs due to their small polarization, high theoretical capacity and suitable working potential. In this review, we provide a critical overview of various metal hydrides ranging from binary hydrides (MgH_2, TiH_2, AlH_3, etc.) to ternary hydrides (B-, Al- and Mg-based ternary hydrides) that are used as anode materials for LIBs, with the employment of organic liquid electrolyte or solid-state electrolyte. The reaction mechanisms, modification methods and electrochemical performances of these

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