

EFFECTS OF CYCLING HYDROGEN AND NITROGEN MIXED GASES ON LITHIUM NITRIDE BASED HYDROGEN STORAGE MATERIALS

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Lithium nitride was exposed to hydrogen containing different levels of nitrogen in one hour absorption-desorption extrinsic pressure cycles. The hydrogen storage capacity was evaluated and found that the nitrogen addition both allowed more of the theoretical hydrogen capacity to be storage as well as improved the stability of the hydrides after up to 1359 cycles. X-ray diffraction data shows that more Li_2NH is present in the desorbed hydride after cycling with the nitrogen addition than is present without. CALPHAD modeling shows that there are regions in the Li-N-H ternary phase diagram where solid lithium is able to form along with lithium amide and imide. It is proposed that the improvement in the storage properties is the result of the nitrogen reacting with this pure lithium.