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Experimental analysis of a metal hydride hydrogen storage system with hexagonal honeycomb-based heat transfer enhancements-part B

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Abstract

This study is a continuation of the computational analysis of the reactor equipped with hexagonal honeycomb based heat transfer enhancements, performed in Part A of the study. In the present study, the performance of the metal alloy and the reactor is investigated experimentally. The gravimetric capacity and reaction kinetics of the alloy $La_{0.9}Ce_{0.1}Ni_5$ are determined. The performance of the reactor under different external environments is noted. The influence of operating conditions such as supply pressure, heat transfer fluid, heat transfer fluid temperature on the reactor performance is investigated. Evaporative cooling as a heat removal technique for metal hydride based hydrogen storage reactors is tested for the first time and compared to conventional heat removal methods. It is found to improve the heat transfer from the alloy bed significantly.

Introduction