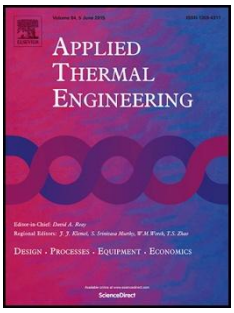
Accepted Manuscript



Title: Effective thermal conductivity of reactive packed beds of hydriding materials

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PII: S1359-4311(16)00067-3
DOI: http://dx.doi.org/doi: 10.1016/j.applthermaleng.2016.01.013
Reference: ATE 7572

To appear in: *Applied Thermal Engineering*

Received date: 15-9-2015
Accepted date: 5-1-2016

Please cite this article as: Yogesh Madaria, E. Anil Kumar, S. Srinivasa Murthy, Effective thermal conductivity of reactive packed beds of hydriding materials, *Applied Thermal Engineering* (2016), http://dx.doi.org/doi: 10.1016/j.applthermaleng.2016.01.013.

EFFECTIVE THERMAL CONDUCTIVITY OF REACTIVE PACKED BEDS OF HYDRIDING MATERIALS

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Highlights

- Measurement of effective thermal conductivity of hydriding beds is reviewed.
- Models on analysis and simulation for estimating the effective thermal conductivity are compared.
- Influence of augmentation techniques on effective thermal conductivity is discussed.
- Effective thermal conductivity data of several metal hydride beds are compiled.

Abstract

Applications of hydriding materials for solid state hydrogen storage, hydrogen compression, thermal energy storage and sorption heating and cooling systems have been demonstrated successfully. However, the performance of these devices significantly depends upon heat and mass transfer characteristics of the reactive packed beds. One of the important parameters regulating heat and mass transfer in the hydriding bed is its effective thermal conductivity (ETC), which is dependent on several operating parameters such as pressure and temperature. ETC also varies significantly due to the variation of hydrogen concentration during the hydriding and dehydriding processes. Based on the extensive studies done by the authors on ETC of metal hydride beds, a review of experimental methods, mathematical studies and augmentation techniques is presented in this paper, with emphasis on the effects of operating parameters on ETC.

Keywords: Reactive packed beds, hydriding materials, effective thermal conductivity, hydrogen, heat transfer augmentation