

Chapter 8

Hydrogen Storage Technologies and Related Heat and Mass Transfer Studies

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ABSTRACT

The energy demands of the future are ever increasing, and hydrogen as an ideal energy carrier can fulfil these demands. The production, purification, delivery, storage, and application are the significant measures of the hydrogen-based economy. The utmost challenge to utilize hydrogen as a fuel lies in the improvement of storage techniques. Hydrogen storage technologies comprise of high-pressure compression, cryogenic liquefaction, and absorption in solid state such as metal hydrides and complex hydrides. As compared with other techniques, hydrogen storage in solid form seems to be one of the utmost likely solutions. However, it involves extremely coupled transport processes such as chemical kinetics, heat, and mass transfer. Complex hydrides are capable substitute aspirants for solid state hydrogen storage because of many advantages, but many of such hydrides suffer from poor kinetics as well as great thermodynamic stability. Significant heat transfer techniques and issues associated with hydrogen storage methods are discussed, with emphasis on metal hydride.

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