

3D Numerical Simulation of Solid State Hydrogen Storage System using Sodium Aluminum Hydride

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Solid-state hydrogen storage with chemical hydride is a challenge for next-generation fuel-cell-powered transportation applications. Heat management in this system is a significant issue due to the low thermal conductivity of chemical hydride. Recently, a compressed hydride with materials of high thermal conductivity has been researched. In this work, we performed a 3D heat and mass transport simulation to design effective solid-state hydrogen storage tanks using a compressed NaAlH_x material with expanded natural graphite and graphene. Chemical kinetics and phase equilibrium are considered for chemical hydride regarded as a porous medium in hydrogen storage tank. Through this simulation, optimum design parameters of heat exchange system will be discussed.