26th National Symposium on Cryogenics and Superconductivity

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Cryosorption storage of hydrogen in activated carbon: finite element analysis

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Content :

Cryosorption storage of hydrogen in carbonaceous material has been known be an effective means of carrying hydrogen on-board for vehicular application. The gravimetric and volumetric storage density achieved by the cryosorption storage of hydrogen in activated carbon at liquid nitrogen temperature is comparable to other hydrogen storing processes like compressed hydrogen gas storage, liquefied hydrogen storage and metal hydride storage. However, the challenges still remain with the filling of the hydrogen in stipulated time, managing the temperature and pressure anisotropy created within the storage vessel due to fast filling. Study of the thermal effects during charging/discharging of packed bed hydrogen storage tank is the primary objective of this work. The partial differential equations relating mass, energy and momentum balance in the transient form for storing hydrogen in activated carbon has been solved by finite element methods using Comsol Multiphysics. The cryosorption storage of hydrogen being dependent on multiple variables, parametric study has been done to see the effect of various parameters on the hydrogen storage capacity in activated carbon.

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