

Cryogenic Adsorption of Hydrogen Isotopes over Nano-Structured Materials

X. Xiao*, L. K. Heung

Savannah River National Laboratory, Bldg. 999-2W, Aiken SC 29808, USA

Hydrogen adsorption at cryogenic temperature has wide potential applications such as in fusion technology development, ^3He purification and hydrogen isotope separation. Cryogenic adsorption is effective to remove low concentration of hydrogen isotopes completely from bulk helium gas. At low temperatures, lots of porous materials also present isotopic effects that can be used to separate hydrogen isotopes. However, materials for cryogenic adsorption are not as well studied as hydrides. Recently various nano-engineered nonmetallic and non-hydride materials were tested and ranked for hydrogen adsorption at cryogenic temperature. Hydrogen isotherm using vacuum-static techniques and hydrogen uptake at flow-kinetic conditions were studied. Results on hydrogen uptake, isotopic effect between deuterium and protium, effect of moisture level as well as material porosity and surface area will be presented.