Abstract

High surface area physisorption materials are of interest for room temperature (RT) hydrogen storage enhancement by spillover. In this study, six different commercially available hypercrosslinked polystyrenes were screened considering the specific surface area, average pore size, pore volume, and adsorption enthalpy. MN270 was selected mainly due to its high surface area and narrow pores for investigation of the spillover enhancement at RT. Two different platinum (Pt) doped MN270 samples were prepared by wet impregnation (MN270-6wt%Pt) and bridge building technique (MN270-Bridged) with an average Pt particle size of 3.9 and 9.9 nm, respectively, as obtained from X-ray diffraction analysis. Pt doping altered the surface property of MN270, and reduced the nitrogen and hydrogen uptake at 77 K and 1 atm due to pore blocking. The RT hydrogen uptake at 100 atm demonstrated a 10% enhancement (0.36 wt. %) for MN270-Bridged compared to pristine MN270, but did not show any enhancement for MN270-6wt%Pt under the same conditions. The hydrogen uptake of MN270-Bridged has little value for practical applications yet showed the effectiveness of the bridge building technique.

Citation

DE Demirocak, MK Ram, SS Srinivasan, A Kumar, DY Goswami, EK Stefanakos, Spillover enhancement for hydrogen storage by Pt doped hypercrosslinked polystyrene. International Journal of Hydrogen Energy, 2012, 37, 12402-10.