Preparation and characterization of aminopropyl-functionalized mesoporous silica HMS as CO_2 adsorbents

고용식*, 장현태[1], 박윤국[2]
신성대학; [1]한서대학교; [2]홍익대학교
(ysko@shinsung.ac.kr*)

Hexagonal mesoporous silicas (HMS) were synthesized via a neutral templating technique using dodecylamine and functionalized with 3-aminopropyltriethoxysilane to form hybrid materials suitable for carbon dioxide adsorption. Aminopropyl-functionalized HMS materials were characterized by X-ray powder diffraction (XRD), transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FT-IR), N_2 adsorption/desorption, thermal gravimetric analysis (TGA) as well as CO_2 adsorption/desorption performance. The functionalized materials have hexagonal meostructure ordering, high surface area, and narrow pore size distribution. The CO_2 adsorption capacity of the aminopropyl-grafted HMS adsorbent was compared with that of the adsorbent prepared by the coating method. The aminopropyl-functionalized HMS adsorbent prepared by coating method showed a higher CO_2 adsorption capacity than that of prepared by grafting method. These hybrid materials were found to have substantial reversible CO_2 adsorption capacities.