

Surface Modification of Poly High Internal Phase Emulsion by Solution Plasma Process for CO₂ Adsorption

Authors : Mookyada Mankrut, Manit Nithitanakul

Abstract : An increase in the amount of atmospheric carbon dioxide (CO₂) resulting from anthropogenic CO₂ emission has been a concerned problem so far. Adsorption using porous materials is feasible way to reduce the content of CO₂ emission into the atmosphere due to several advantages: low energy consumption in regeneration process, low-cost raw materials and, high CO₂ adsorption capacity. In this work, the porous poly(divinylbenzene) (poly(DVB)) support was synthesized under high internal phase emulsion (HIPE) polymerization then modified with polyethyleneimine (PEI) by using solution plasma process. These porous polymers were then used as adsorbents for CO₂ adsorption study. All samples were characterized by some techniques: Fourier transform infrared spectroscopy (FT-IR), scanning electron spectroscopy (SEM), water contact angle measurement and, surface area analyzer. The results of FT-IR and a decrease in contact angle, pore volume and, surface area of PEI-loaded materials demonstrated that surface of poly(DVB) support was modified. In other words, amine groups were introduced to poly(DVB) surface. In addition, not only the outer surface of poly(DVB) adsorbent was modified, but also the inner structure as shown by FT-IR study. As a result, PEI-loaded materials exhibited higher adsorption capacity, comparing with those of the unmodified poly(DVB) support.

Keywords : polyHIPEs, CO₂ adsorption, solution plasma process, high internal phase emulsion

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