

Amine functionalized radiation induced grafted polyolefin nanofibers for CO₂ adsorption

ABSTRACT

A new type of nanofibrous amine-containing adsorbent was prepared for CO₂ adsorption by electrospinning of syndiotactic polypropylene (s-PP) followed by radiation induced grafting of glycidyl methacrylate and subsequent amination with ethanolamine. The obtained adsorbents were tested for CO₂ adsorption with a mixture of CO₂/N₂ having 5–15% CO₂ using a fixed bed adsorption column at atmospheric pressure. A maximum adsorption capacity of 2.87 mmol/g was achieved for the sample with degree of grafting of 300% and degree of amination of 94% at feed concentration of 15% at 30 °C. This was accompanied by good mechanical characteristics and a very high amine efficiency that reached 75% at room temperature, suggesting that the obtained fibrous adsorbent has high potential for CO₂ adsorption.

Keyword: CO₂ adsorption; Solid supported adsorbent; Radiation induced grafting; Nanofibers; Glycidyl methacrylate