An electrospun PAN/MOF nanofiber mat for selective CO_2 capture with excellent stability

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The dependency of human beings on fossil fuels as an energy source led to increase in CO2 concentration in the atmosphere, which belongs to one the powerful greenhouse gas responsible for global warming. Carbon capture and storage (CCS) is one of the most promising technique for the reducing the atmospheric CO_2 concentration. In this study, we developed novel PAN/MOF electrospun nanofiber adsorbents synthesized by a multiple seeded growth process of MOF using a microwave irradiation method. The as-prepared fiber adsorbents were characterized for morphology, crystal structure, surface area, and thermal stability using SEM, XRD, BET, and TGA respectively. The CO_2 and N_2 adsorption performance of all the samples were evaluated by volumetric method using volumetric apparatus (Belsorp mini II) at the pressure of 1 bar and temperature 298 K. The as-prepared PAN/MOF fibers showed excellent CO_2 capture performance with improved CO_2/N_2 selectivity as compared to parent MOF powder. In addition, the fibers were also examined for the stability by exposing samples to acid gases (NO_2 and SO_2) under humid atmosphere.