Diamine-Functionalized MOF-Based Fiber Sorbents for CO_2 Capture

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Because increasing atmospheric CO_2 concentrations by anthropogenic emissions has been accelerated the global atmospheric change, the efficient CO_2-capturing processes have been required. In CO_2 capture field, metal organic frameworks (MOFs) as solid sorbents are attracting attention as materials which have not only a high specific surface area due to its microporous property, but also an excellent CO_2 adsorption capacity because they are physisorbents. However, the MOF loses CO_2 adsorption capacity up to 80% under humid conditions. Recently, diamine-functionalized adsorbents are effective for CO_2 capture at low CO_2 partial pressures and can be stabilized in water via decoration with amine group on the open metal site of MOFs. In addition, fiber matrix can possess high loading of adsorbent and good mass transfer rate.

In this study, using a two-step spinning and post-spinning such as conversion and insertion reaction, we demonstrated the synthesis of mmen-Mg_2(dobdpc) MOF fiber sorbents from magnesium oxide (MgO) fiber sorbent precursors. We confirmed the material properties and performances of the sample by XRD, SEM, BET, and CO_2 sorption tests under various conditions.