Research on Chemical Intermediates

Comparison of MOF-5- and Cr-MOF-derived carbons for hydrogen storage application

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Abstract

Nanoporous carbons which possess high surface areas and narrow pore size distributions have become one of the most important classes of porous materials with potential to be utilized for hydrogen storage. In recent times, several metal–organic frameworks (MOFs) have been shown to be promising precursors for creating nanoporous carbons due to their high surface areas and tunable pore sizes. The pore structure and surface area of the resultant carbon materials can be tuned simply by changing the calcination temperature. In this work, a zinc-based MOF (MOF-5) and a chromium-based MOF (Cr-MOF) were both used as precursors for syntheses of nanoporous carbons by the direct carbonization technique at different temperatures. The resultant carbon nanostructure from MOF-5 possessed higher surface area, higher pore volume and enhanced hydrogen storage capacity as compared to pristine MOF. Meanwhile, the derived carbons from Cr-MOF displayed lower surface areas, pore volumes and hydrogen uptake than the parent MOF due to the formation of chromium oxide and carbide species in the pores of the Cr-MOF-derived carbons.