

Fabrication of coreshell MIL-101(Cr)@UiO-66(Zr) nanocrystals for hydrogen storage

Jianwei Ren ^{a,*}, Nicholas M. Musyoka ^a, Henrietta W. Langmi ^a, Brian C. North ^a, Mkhulu Mathe ^a, Xiangdong Kang ^b

^a HySA Infrastructure Centre of Competence, Materials Science and Manufacturing, Council for Scientific and Industrial Research (CSIR), PO Box 395, Pretoria 0001, South Africa

^b Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, 72 Wenhua Road, Shenyang 110016, China

Abstract

The fabrication of coreshell nanocrystals by incorporating microporous UiO-66 into mesoporous MIL-101 is reported. The growth of the coreshell MIL-101@UiO-66 nanocrystals was observed and supported by TEM and PXRD. The accessible pore volumes of the individual metal-organic framework (MOF) components and the coreshell hybrid crystals were also characterized. The hydrogen storage capacity exhibited by the resulting core shell nanocrystals was 26% and 60% higher than those of pure phase MIL-101 and UiO-66, respectively. Finally, the fabricated coreshell MIL-101@UiO-66 structure exhibited a high degree of moisture tolerance.