

Framework size controlled ordered mesoporous metallic MoO₂ electrode for Lithium-ion batteries

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Highly ordered mesoporous metallic MoO₂ materials with bicontinuous *Ia3d* mesostructure were successfully synthesized by using ammonium molybdate tetrahydrate as a precursor and mesoporous silica KIT-6 as a hard template *via* nanocasting strategy. Ordered mesoporous silica KIT-6 with different pore diameters has been synthesized by controlling hydrothermal treatment temperature to identify how the critical dimensions of pore size and wall thickness are for control the rate of intercalation (electrode reaction) for lithium storage. By preparing a series of electrodes based on mesoporous MoO₂ as the intercalation host, with wall thicknesses ranging from 4 to 8 nm, it has been possible to explore the influence of wall thickness on Li storage. The obtained mesoporous MoO₂ material(meso-MoO₂-100) exhibits an anodic discharge capacity of 1814 mAhg⁻¹ with an initial Coulombic efficiency of 72.1% for the first cycle, and a discharge capacity of 1607 mAhg⁻¹ after 50 cycles at 0.1 C, which is much higher than its theoretical value of 838 mAhg⁻¹.