

Synthesis and Characterization of Ordered Mesoporous Manganese Oxides with Various Oxidation State using post reduction/oxidation

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Synthesis of mesoporous manganese oxide has attracted considerable attention due to their diversity of structures and impressive properties in wide range of interesting applications as adsorbents, catalysis, electronics, energy storage, optics and sensors. Many kinds of manganese oxides with different crystal structure are possible due to the various oxidation states of manganese including Mn(II), Mn(III), Mn(IV), etc. There are 4 representative manganese oxides: MnO_2 , Mn_2O_3 , Mn_3O_4 and MnO.

Ordered mesoporous MnO_2 , Mn_2O_3 , Mn_3O_4 and MnO with 3D pore structure have been successfully synthesized via nano-casting method by using mesoporous silica, KIT-6 as template under subsequence specific reaction condition. Mesoporous MnO was synthesized for the first time by reducing the mesoporous Mn_3O_4 under H_2 atmosphere without pore structural collapse. All of the mesoporous manganese oxides with different crystal structure have uniform mesopore and framework with large surface area and pore volume.