Synthesis of First Transition Metal Oxides with Ordered Nanoporous Structure and their Application for Lithium Sulfur Battery Cathode

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Lithium-sulfur batteries are up-and-coming electrochemical devices due to its advantages such as high specific capacity and energy density compared to conventional LIBs. Despite its superiority, practical use of Li-S battery is impeded because of its obstacles; insulating characteristic of sulfur and dissolution of polysulfide Intermediates during charge/discharge process. To overcome these problems, majority of studies have focused on porous carbon materials not only to impart sulfur conductivity but also to capture polysulfide by physisorption, capillary force. Herein, we present new possibility of porous metal oxides (MO_x) for Li-S battery cathode as host material to embed sulfur. We expect that the ordered mesoporous MO_x cathode can effectively trap polysulfide by chemisorption and retard the dissolution. Consequently, it results in better cycling performance of battery. Ordered mesoporous MO_x in the first row transition metal (TiO_2,MnO,NiO) were synthesized by a nano-replication method via ordered mesoporous silica template (KIT-6). The materials were characterized by X-ray diffraction (XRD), N_2 adsorption/desorption, scanning electron microscopy (SEM). And electrochemical investigation was performed.