Design of Ordered Mesoporous Molybdenum Dioxide for Li-ion Rechargeable Battery

손정국, 김한수[1], 박귀옥, 박찬호[1], 김지만*
성균관대학교; [1]삼성종합기술원
(jimankim@skku.edu*)

The molybdenum dioxide (MoO_2) with a distorted rutile structure have attracted much attention in the fields of catalysis, sensing, electrochromic displays, recording media, electrochemical supercapacitors, and field emission, because MoO_2 has low resistivity, high melting point and high chemical stability. Generally, the MoO_2 prepared by thermal evaporation and reduction of MoO_3 nano-particle which prepared by de-ionized water and a few drops of a binder. The synthesized MoO_2 nanoparticle was low catalytic activation due to the extremely low surface area (<5 m^2/g). Here, we reported a facile nano-replication synthesis method of highly ordered mesoporous MoO_2 and application of Li-ion rechargeable battery. Ordered mesoporous crystalline MoO_2 with 3D cubic meso-structure were synthesized by using KIT-6 as silica template in N_2 atmosphere via nano-replicatoin route. The prepared mesoporous MoO_2 shows well developed porosity and high surface area (> 100 m^2/g). More importantly, prepared mesoporous MoO_2 exhibits capacity higher 800 $mAhg^{-1}$ at a charge-discharge rate of 160 mA/h, and capacity retention of 800 $mAhg^{-1}$ after 50 cycles, rending it as a promising anode materials for Li-ion rechargeable battery.