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Synthesis of Nanostructured Molybdenum Oxide by Hydrothermal Method as Anode Materials of li-ion Battery

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ABSTRACT

In present work, Molybdenum oxide nanoparticles were synthesized via a facile and template-free hydrothermal method and as prepared sample was annealed at 500°C. The microstructural and electrochemical performance of the samples were studied. X-ray diffraction results revealed the formation of MoO_2 and MoO_3 at room temperature and 500°C respectively. The intensity of the diffracted peaks increased as the annealed temperature was increased. SEM image showed presence of nano grains interconnecting with each other. The electrochemical performance of MoO_2 and MoO_3 showed a high specific capacity of 824 $mAhg^{-1}$ and 1174 $mAhg^{-1}$ respectively. A high reversible capacity of 760 $mAhg^{-1}$ was obtained after 30 cycles as an anode for lithium storage system. The interconnected MoO_2 nanostructured materials also exhibit an excellent rate performance. The superior electrochemical performance of MoO_3 was attributed to its lamellar like morphology which allowed faster lithium ion diffusion in addition to buffering the volume changes during lithiation/de-lithiation. Therefore, they were considered very attractive candidate for efficient electrochemical energy storage systems.

Keywords- X-ray diffraction, Nanostructure, Hydrothermal, specific capacity, anode materials