Synthesis of MnMoO₄ Nanorods by a Simple Co-Precipitation Method in Presence of Polyethylene Glycol for Pseudocapacitor Application

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Recent attention has focused on the synthesis and application of the binary oxide-based nanomaterial, which can have superior electrochemical performance than the single oxide materials. The metal molybdate has drawn significant attention due to its multiple oxidation states of molybdenum ion and its large electrical activity has been extensively studied in energy storage application. Here, we synthesized MnMoO₄ nanorods through the co-precipitation method with the aid of the polyethylene glycol (PEG) surfactant and its electrochemical properties are investigated toward the supercapacitor application. The crystalline structure and surface morphology of PEG-MnMoO₄ are evaluated by X-ray diffraction, Raman, field emission scanning electron microscope and elemental mapping, reveals the as-prepared PEG-MnMoO₄ exhibits uniform nanorods or forefinger-like morphology with monoclinic phase crystal structure. The as-fabricated PEG-MnMoO₄ nanorods electrode showed very high discharge capacity 424 F g⁻¹ at a current density of 1 A g⁻¹ with a large potential window 1.8 V vs. Ag/AgCl in 1 M Na₂SO₄. Hence, the surfactant-assisted synthesis of MnMoO₄ nanorods can be the best energy storage material that can deliver higher specific discharge capacity when it's combined with suitable supporting matrices.

Keywords: Co-precipitation method; Manganese molybdate; Pseudo capacitive materials; Binary transition metal oxide.

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