Fabrication and Application of Molybdenum Trioxide Nanostructure Materials for Electrochemical Capacitors

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In this paper, a new method of “top-down” metal-assisted chemical wet etching to fabricate MoO₃ nanostructure materials is put forward for the first time by the authors, which overcomes the weakness such as complex technology and high cost. In the solution system of AgNO₃/HNO₃, the fabrication of MoO₃ nanostructure materials is conducted under certain conditions and then the samples are annealed under high temperature as 500 - 700 °C. Observed by scanning electron microscope (SEM), when the concentration of AgNO₃ is 0.01 M, HNO₃ solution concentration as 3.6 M, the temperature as (20 ± 2) °C, the etching time as 90 min, the anneal temperature as 600 °C, the fabricated MoO₃ nanostructure materials has well morphology. In 0.5 M Na₂SO₄ solution, the sample electrode (600 °C) shows a higher capacitance of 30.85 F g⁻¹ at 10 mV / s. The method above to fabricate MoO₃ owns the superiority such as simple, low cost and easy to control the reaction process, so it will be popularized for large-scale fabrication of MoO₃ nanostructure materials.

Keywords: Molybdenum trioxide nanostructure materials; Metal-assisted chemical etching; Top-down method; Electrochemical capacitors

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