Fabrication and Application of Molybdenum Trioxide Nanostructure Materials for Electrochemical Capacitors

Fengjuan Miao¹,*, Wenyi Wu¹, Qianqian Li¹, Rui Miao¹, Bairui Tao¹,² *

¹ College of Communications and Electronics Engineering, Qiqihar University, Heilongjiang 161006, China
² Modern Education Technology Center, Qiqihar University, Heilongjiang 161006, China
E-mail: miaofengjuan@163.com, tbr_sir@163.com


Received: 28 July 2016 / Accepted: 5 June 2016 / Published: 12 November 2016

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

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/4.0/).