Facile Preparation of MnO₂ with Large Surface Area in a Rotor–Stator Reactor for Supercapacitors

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doi: 10.20964/2016.11.48

Received: 14 August 2016 / Accepted: 17 September 2016 / Published: 10 October 2016

Facile preparation of MnO₂ with large specific surface area was explored in a rotor–stator reactor (RSR). The MnO₂ product was characterized by FESEM, TEM, XRD, XPS, TG, FTIR and automated surface area and pore size analyzer. The electrochemical performance of the as-prepared MnO₂ nanospheres as an electrode material for supercapacitors was investigated using three-electrode and two-electrode methods. The results show that the MnO₂ nanospheres were well dispersed and had a surface area of 337.01 m² g⁻¹. The specific capacitance was as high as 320.7 F g⁻¹ at 0.3 A g⁻¹ and 477.5 F g⁻¹ at 5 mV s⁻¹. The as-prepared MnO₂ also exhibited good stability with 107.4 % capacitance retention after 1000 cycles. Moreover, the MnO₂/active carbon asymmetric supercapacitor in 1 M Na₂SO₄ electrolyte showed a maximum energy density of 27.23 W h kg⁻¹ and correspondingly power density was 225 W kg⁻¹.

Keywords: manganese dioxide; rotor–stator reactor; surface area; supercapacitor

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