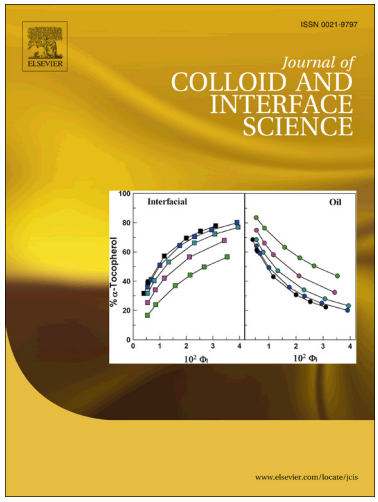

Hydrothermal synthesis and Electrochemical performances of 1.7 V Ni-$MoO_4.xH_2O$||$FeMoO_4$ aqueous hybrid supercapacitor

Baskar Senthilkumar, Ramakrishnan Kalai Selvan

PII: S0021-9797(14)00214-8
DOI: http://dx.doi.org/10.1016/j.jcis.2014.04.010
Reference: YJCIS 19497

To appear in: *Journal of Colloid and Interface Science*

Received Date: 22 February 2014
Accepted Date: 3 April 2014

Please cite this article as: B. Senthilkumar, R.K. Selvan, Hydrothermal synthesis and Electrochemical performances of 1.7 V $NiMoO_4.xH_2O$||$FeMoO_4$ aqueous hybrid supercapacitor, *Journal of Colloid and Interface Science* (2014), doi: http://dx.doi.org/10.1016/j.jcis.2014.04.010

Hydrothermal synthesis and Electrochemical performances of 1.7 V $NiMoO_4.xH_2O$||$FeMoO_4$ aqueous hybrid supercapacitor

Baskar Senthilkumar and Ramakrishnan Kalai Selvan*

Solid State Ionics and Energy Devices Laboratory, Department of Physics, Bharathiar University, Coimbatore-641 046, India

Abstract

One-dimensional (1D) $NiMoO_4.xH_2O$ nanorods and β$FeMoO_4$ microrods are successfully synthesized by simple hydrothermal method without using any organic solvents. X-ray diffraction (XRD) patterns reveal the single phase formation of nickel molybdate ($NiMoO_4.xH_2O$) and pure monoclinic phase of β$FeMoO_4$. The growth of one dimensional morphology of both the molybdate is identified from scanning and transmission electron microscopic (SEM & TEM) images. The cyclic voltammogram envisage the pseudocapacitance behaviour of $NiMoO_4.xH_2O$ and β$FeMoO_4$ through the reversible redox reactions of Ni^{3+}/Ni^{2+} and Fe^{3+}/Fe^{2+} ions. An asymmetric supercapacitor is fabricated using $NiMoO_4.xH_2O$ nanorods and β$FeMoO_4$ as a positive and negative electrode, respectively. The β$FeMoO_4$||$NiMoO_4.xH_2O$ asymmetric supercapacitor delivers a capacitance of 81 F g^{-1} at a current density of 1 mA cm^{-2}. The cell exhibits a high energy density of 29 W h kg^{-1} and good cycling stability even after 1000 cycles.

Keywords: Nickel molybdate, Iron molybdate, Asymmetric capacitor, Pseudocapacitance, Energy Density

***Corresponding author:** selvankram@buc.edu.in (R.K.Selvan)