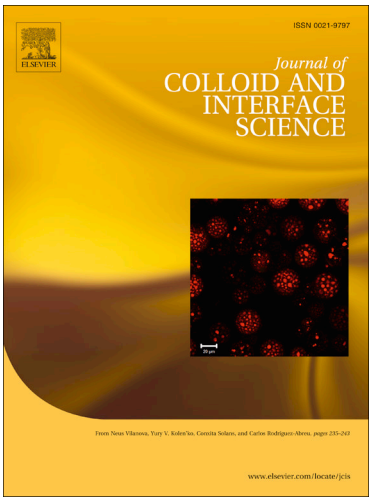

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PII: S0021-9797(17)30854-8
DOI: http://dx.doi.org/10.1016/j.jcis.2017.07.087
Reference: YJCIS 22616

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

Received Date: 2 June 2017
Revised Date: 19 July 2017
Accepted Date: 22 July 2017

Please cite this article as: N. Parveen, S.A. Ansari, M.O. Ansari, M.H. Cho, Manganese dioxide nanorods intercalated reduced graphene oxide nanocomposite toward high performance electrochemical supercapacitive electrode materials, *Journal of Colloid and Interface Science* (2017), doi: http://dx.doi.org/10.1016/j.jcis.2017.07.087

Manganese dioxide nanorods intercalated reduced graphene oxide nanocomposite toward high performance electrochemical supercapacitive electrode materials

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Abstract

The development of manganese dioxide-based nanocomposites as materials for energy storage applications is advantageous because of its polymorphism behavior and structural flexibility. In this study, manganese dioxide (MnO_2) nanorod-intercalated reduced graphene oxide (rGO) nanocomposite was obtained through a simple hydrothermal method and their electrochemical supercapacitance was studied in a three electrode half-assembly electrochemical cell. The basic spectroscopic and diffraction data including Raman spectroscopy, scanning electron microscopy, and transmission electron microscopy were employed to characterize the resulting nanocomposite. Cyclic voltammetry and galvanostatic charge-discharge measurements were conducted to evaluate the electrochemical supercapacitance of the rGO-MnO_2 nanocomposite electrode. The rGO-MnO_2 nanocomposite delivered significantly higher capacitance than the P-MnO_2 under similar measurement conditions. This enhanced supercapacitive performance of the rGO-MnO_2 nanocomposite was attributed to chemical interactions and the synergistic effect between rGO and MnO_2, which was helpful in enhancing the electrical conductivity and providing sufficient space for electrode/electrolyte contact during the electrochemical reaction.