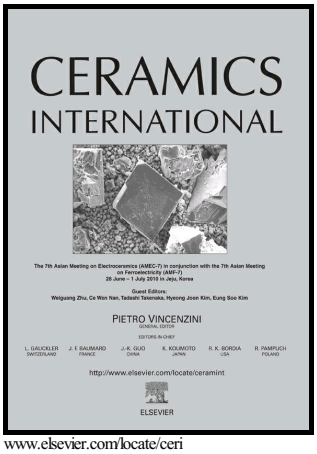

www.elsevier.com/locate/ceri

V_2O_3/rGO composite as a potential anode material for lithium ion batteries

Bin Xiao, Bao Zhang, Lin-bo Tang, Chang-sheng An, Zhen-jiang He, Hui Tong, Wan-jing Yu, Jun-chao Zheng

PII: S0272-8842(18)31280-X
DOI: https://doi.org/10.1016/j.ceramint.2018.05.134
Reference: CERI18309

To appear in: *Ceramics International*

Received date: 9 May 2018
Revised date: 14 May 2018
Accepted date: 15 May 2018

Cite this article as: Bin Xiao, Bao Zhang, Lin-bo Tang, Chang-sheng An, Zhen-jiang He, Hui Tong, Wan-jing Yu and Jun-chao Zheng, V_2O_3/rGO composite as a potential anode material for lithium ion batteries, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2018.05.134

V_2O_3/rGO composite as a potential anode material for lithium ion batteries

Bin Xiao, Bao Zhang, Lin-bo Tang, Chang-sheng An, Zhen-jiang He, Hui Tong, Wan-jing Yu, Jun-chao Zheng*

School of Metallurgy and Environment, Central South University, Changsha 410083, P.R. China

Abstract V_2O_3 is a promising anode material and has attracted the interests of researchers because of its high theoretical capacity of 1070 mAh g^{-1}, low discharge potential, inexpensiveness, abundant sources, and environmental friendliness. However, the development and application of V_2O_3 have been hindered by the low conductivity and drastic volume change of V_2O_3 composites. In this work, V_2O_3/reduced graphene oxide (rGO) nanocomposites are successfully prepared through a facile solvothermal method and annealing process. In this synthesis protocol, V_2O_3 nanoparticles (NPs) are encapsulated by rGO. This unique structure enables rGO to inhibit volume changes and improve the ion and electronic conductivity of V_2O_3. In addition, V_2O_3 NPs, which exhibit sizes of 5–40 nm, are uniformly dispersed on rGO sheets without aggregation. The Li^+ storage behavior of V_2O_3/rGO is systematically investigated in the potential range 0.01–3.0 V. The V_2O_3/rGO nanocomposite can achieve a high reversible specific capacity of 823.4 mAh g^{-1} under the current density of 0.1 A g^{-1}, and 407.3 mAh g^{-1} under the high current density of 4.0 A g^{-1}. The results of this study provide insight into the fabrication of rGO-based functional materials with extensive applications.

Keywords: lithium-ion battery, vanadium trioxide, reduced graphene oxide, nanoparticles