Accepted Manuscript

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PII: S0925-8388(17)32360-5

DOI: 10.1016/j.jallcom.2017.07.005

Reference: JALCOM 42421

To appear in: *Journal of Alloys and Compounds*

Received Date: 4 March 2017

Revised Date: 5 June 2017

Accepted Date: 1 July 2017

Please cite this article as: M. Imtiaz, C. Zhu, Y. Li, M. Pak, I. Zada, S.W. Bokhari, Z. Chen, D. Zhang, S. Zhu, Functionalized bioinspired porous carbon with graphene sheets as anode materials for lithium-ion batteries, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.07.005.

Functionalized bioinspired porous carbon with graphene sheets as anode materials for lithium-ion batteries

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ABSTRACT

Inspired by hierarchical structures of natural species, we developed a facile and inexpensive approach to synthesize a novel hierarchical modified porous carbon/graphene (MPC/RGO) composite material. The porous carbon was obtained from sugarcane bagasse and later combined with reduced graphene oxide by using a hydrothermal method to produce the MPC/RGO. The obtained MPC/RGO composite was characterized by X-ray diffraction (XRD), Raman spectroscopy, scanning electron microscopy (SEM) and transmission electron microscopy (TEM). As an anode for lithium-ion battery, it delivers a high reversible discharging capacity of 617.3 mAh g^{-1} after 600 cycles at a current density of 200 mA g^{-1}, which is significantly higher than 272.5 mAh g^{-1} of the mechanical mixture of the modified porous carbon (MPC) and RGO at the same testing condition. This impressive electrochemical performance showed by the MPC/RGO composite is attributed to the chemical bonds formed between the reduced graphene oxide sheets and the hierarchical porous carbon. This simple synthesis approach and the high performance of the product is a dream combination in the development of novel and smart materials.

Keywords: Bioinspired porous carbon, Bagasse, Nitric acid treatment, Graphene, Lithium-ion battery