Accepted Manuscript

A novel three-dimensional graphene for remarkable performance of electrochemical energy storage

Zhigang Zhang, Jinping Zhao, Lianlian Gao, Jin Zhou, Zhichao Miao, Yi Zhao, Shuping Zhuo

PII: S0013-4686(17)32598-7

DOI: 10.1016/j.electacta.2017.12.038

Reference: EA 30826

To appear in: *Electrochimica Acta*

Received Date: 1 October 2017

Revised Date: 16 November 2017

Accepted Date: 6 December 2017

Please cite this article as: Z. Zhang, J. Zhao, L. Gao, J. Zhou, Z. Miao, Y. Zhao, S. Zhuo, A novel three-dimensional graphene for remarkable performance of electrochemical energy storage, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2017.12.038.

A Novel Three-Dimensional Graphene for Remarkable Performance of Electrochemical Energy Storage

Zhigang Zhang, Jinping Zhao, Lianlian Gao, Jin Zhou, Zhichao Miao,Yi Zhao, Shuping Zhuo**

School of chemistry & chemical engineering, Shandong University of Technology, Zibo 255049, P. R. China

E-mail: jpzhao@sdut.edu.cn; zhuosp_academic@yahoo.com

Keywords: Three-dimensional graphene; Supercapacitor; Lithium ion battery; Interfacial interaction; Energy storage

Abstract

Three-Dimensional graphene (3D-G) material is regarded as an excellent carbon material, which reveals cross-linked porous structure, high specific surface area, strong mechanical strength and high conductivity inheriting from the graphene. In this work, we fabricate the novel 3D-G based materials by decoration of sodium citrate (SC) for supercapacitor and lithium ion batteries (LIBs) applications. SC with abundant functional groups and short carbon chain can ensure the interface between graphene sheets or between graphene and other composite materials, lead to shorter diffusion path for ions transportation. Owing to the large surface area and pore volume, 3D-G(SC) shows outstanding specific capacitance (301 F g^{-1}) when it is applied in supercapacitors. Besides that, 3D-G(SC) compounds with Fe_3O_4 particles and 3D-G@Fe_3O_4(SC) are applied in LIBs. The 3D-G@Fe_3O_4 (SC) has a higher discharge capacity (1310.6 mA h g^{-1}) than 3D-G@Fe_3O_4 (1270 mA h g^{-1}) at 0.1 C,