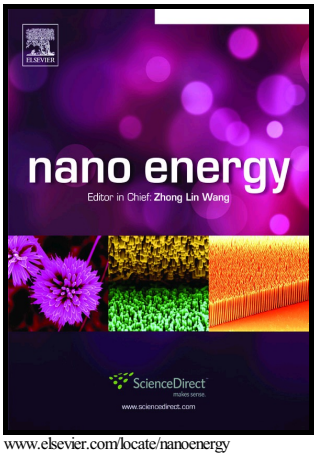

www.elsevier.com/locate/nanoenergy

Low-Temperature Plasma Exfoliated N-Doped Graphene for Symmetrical Electrode Supercapacitors

Keliang Wang, Ming Xu, Yan Gu, Zhengrong Gu, Jun Liu, Qi Hua Fan

PII: S2211-2855(16)30492-X
DOI: http://dx.doi.org/10.1016/j.nanoen.2016.11.007
Reference: NANOEN1598

To appear in: *Nano Energy*

Received date: 26 August 2016
Revised date: 2 November 2016
Accepted date: 7 November 2016

Cite this article as: Keliang Wang, Ming Xu, Yan Gu, Zhengrong Gu, Jun Liu and Qi Hua Fan, Low-Temperature Plasma Exfoliated N-Doped Graphene for Symmetrical Electrode Supercapacitors, *Nano Energy* http://dx.doi.org/10.1016/j.nanoen.2016.11.007

Low-Temperature Plasma Exfoliated N-Doped Graphene for Symmetrical Electrode Supercapacitors

Keliang Wang[a], Ming Xu[d], Yan Gu[e], Zhengrong Gu[a1*], Jun Liu[b2*], Qi Hua Fan[c3*]

aAgricultural and Biosystems Engineering Department, South Dakota State University, Brookings, SD 57007, United States

bEnergy Processes and Materials Division, Pacific Northwest National Laboratory, Richland, WA 99352, United States

cElectrical Engineering and Computer Engineering, Chemical Engineering and Materials Science Department, Michigan State University East Lansing, MI 48824, United States

dPetroChina Lanzhou Petrochemical Company, Lanzhou, Gansu, 730060, China

eInstitute of Chemical Industry of Forest Products, Nanjing, Jiangsu, 21000, China

zhengrong.gu@sdstate.edu (Z. R. Gu)

jun.liu@pnnl.gov (J. Liu)

qfan@egr.msu.edu **(**Q. H. Fan**)**

Abstract

Radio frequency (RF) dielectric barrier discharge plasma was used to exfoliate graphite oxide (GO) into graphene. The GO was synthesized from a modified Hummers method. The exfoliation occurred swiftly once the RF power and gas pressure reached a level that enabled sufficient energy transfer from the plasma to the GO. X-ray diffraction (XRD) and transmission electron microscopy (TEM) confirmed that graphene or carbon nanosheets were successfully

[1] Tel./fax: + 1 605 688 5372.
[2] Tel./fax: + 1 509 375-4443.
[3] Tel./fax: + 1 605 688-5910.