

Facile Synthesis of Structure-controllable, N-doped Graphene Aerogels and Their Application in Supercapacitors

Xianpan Shi^{1,2,3}, Jiayi Zhu³, Yong Zhang², Shuaijie He^{1,2,3}, Yutie Bi², Lin Zhang^{1,2,3*}

(1. School of Material Science and Engineering, Southwest University of Science and Technology,

Mianyang 621010, China;

*2. Joint Laboratory for Extreme Conditions Matter Properties, Southwest University of Science
and Technology and Research Center of Laser Fusion, China Academy of Engineering Physics,*

Mianyang 621010, China;

3. Research Center of Laser Fusion, CAEP, Mianyang 621900, China)

**Corresponding author. Tel/Fax: +86-0816-2491228. E-mail: zhlmly@sina.com*

Preparation of graphene oxide: Graphene oxide was synthesized from natural graphite by a modified Hummers method. 3 g graphite and 1.5 g sodium nitrate were mixed with 90 mL of concentrated sulfuric acid (98%) in a 500 mL flask. The mixture was stirred for 1 h in an ice bath. 9 g potassium permanganate was added to the suspension under vigorous stirring. The rate of addition was carefully controlled to keep the reaction temperature below 20 °C. After removal of ice bath, the mixture was stirred at 35 °C for 5 h. Additional 6 g potassium permanganate was added in the mixture, and the reaction was stirred for 2 h at 35 °C. Then, the reaction mixture was poured into 400 mL deionized water with vigorous agitation. The diluted suspension was stirred for 30 min. At the end, 10 mL of H₂O₂ (30%) were added to the mixture. The mixture was washed with 5% HCl and deionized water, and dried at 60°C to obtain GO powder.

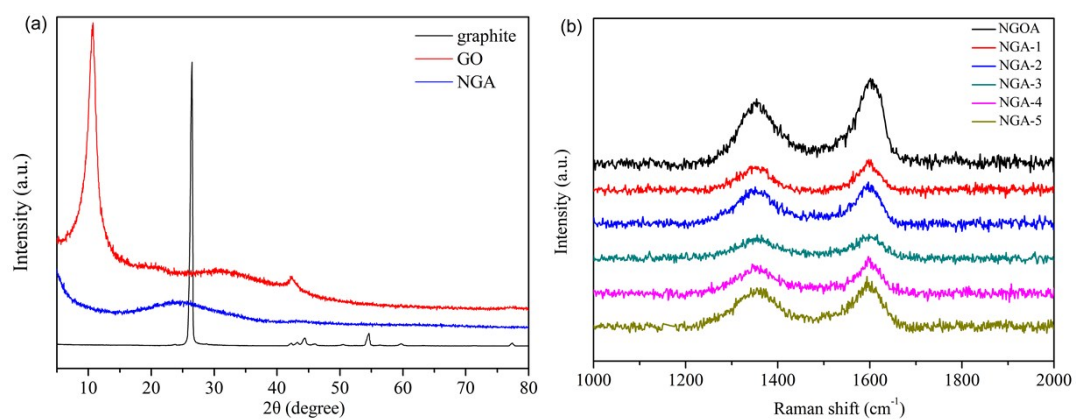


Figure S1. XRD patterns of graphite, GO and NGA-3 (a); Raman spectra of NGOA and NGAs (b).

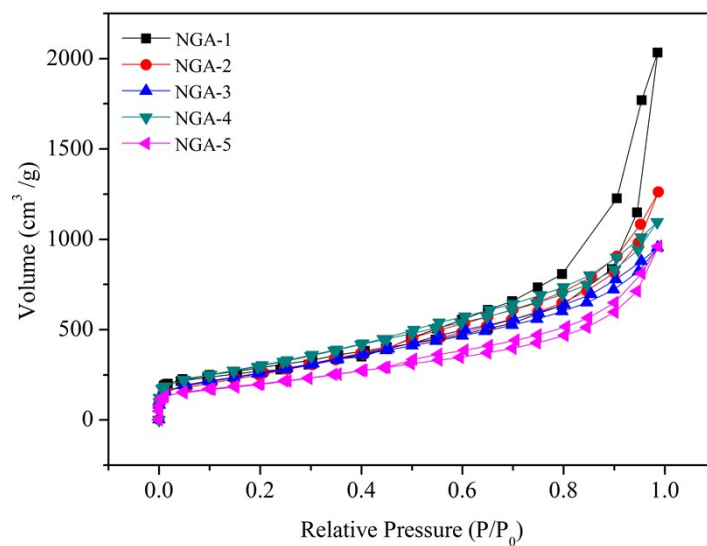


Figure S2. N_2 adsorption/desorption isotherms of all the NGAs.

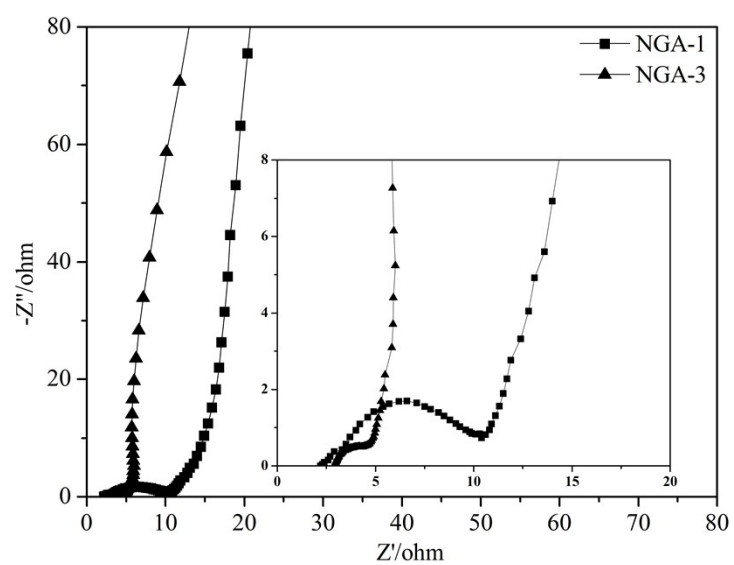


Figure S3. Nyquist impedance plots of NGA-1 and NGA-3.

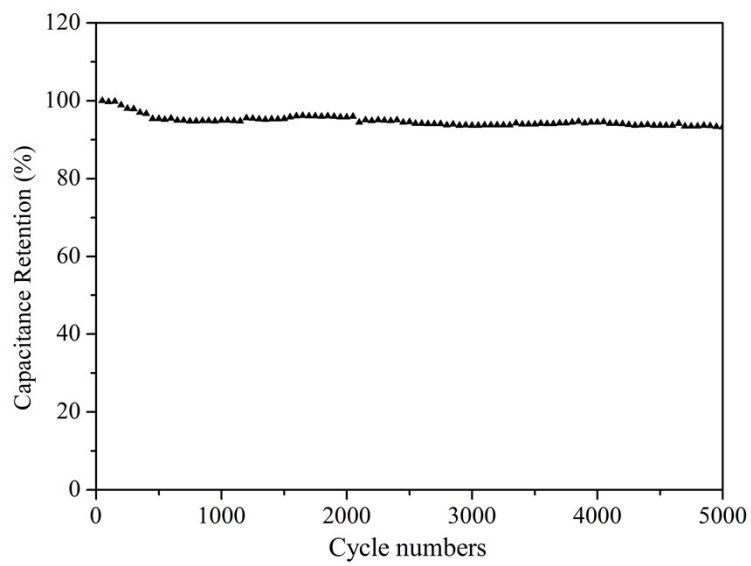


Figure S4. Cyclic performance of NGA-3.

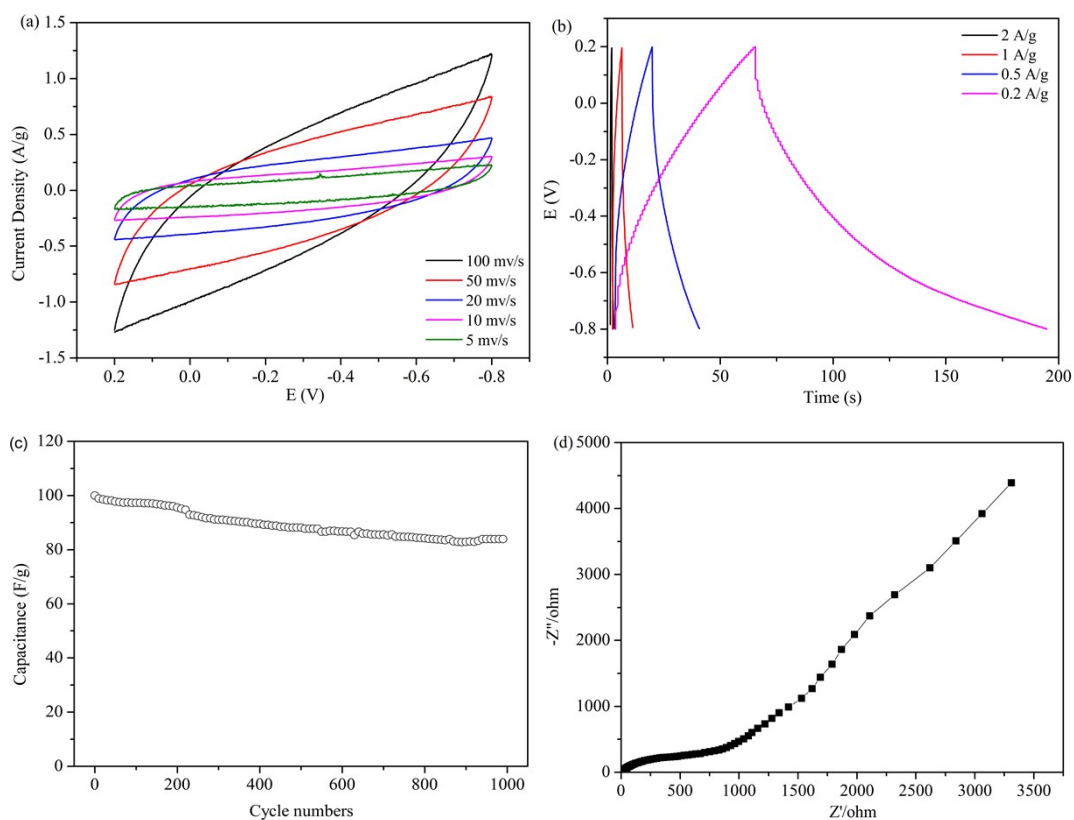


Figure S5. The two-electrode electrochemical performance of NGA-3: CV curves (a), galvanostatic charge/discharge curves (b), cyclic performance (c) and Nyquist impedance plots (d).