

Electronic Supplementary Information

Graphene hydrogels functionalized non-covalently by Alizarin: an ideal electrode materials for symmetric supercapacitor

Ning An, Yufeng An, Zhongai Hu, Bingshu Guo, Yuying Yang, Ziqiang Lei*

Key Laboratory of Eco-Environment-Related Polymer Materials of Ministry of Education, Key Laboratory of Polymer Materials of Gansu Province, College of Chemistry and Chemical Engineering, Northwest Normal University, Lanzhou, Gansu 730070, China.

Calculations of specific capacitance, energy density and power density based on the galvanostatic charge-discharge curves:

(1) In three electrode configuration, specific capacitances derived from galvanostatic tests can be calculated from the equation:

$$C = I\Delta t / m\Delta V \quad (1)$$

where I is the discharging current, t is the discharge time, ΔV is the potential drop during discharge, and m is the mass of active material in the working electrode.

(2) In two electrode symmetric cell configuration, specific capacitances of capacitor derived from galvanostatic tests can be calculated from the equation:

$$C = 4(I\Delta t / m\Delta V) \quad (2)$$

where I is the constant discharge current, Δt is the discharging time, m is the total mass of two electrodes, and ΔV is the voltage drop upon discharging.

Energy density (E) and power density (P) derived from galvanostatic tests can be calculated from the following equations:

$$E = [C (\Delta V)^2] / 8 \quad (3)$$

$$P = E / \Delta t \quad (4)$$

where E, C, ΔV , P and Δt are the specific energy, specific capacitance, potential window, specific power and discharge time, respectively.

*Corresponding author. Tel.: +86 931 7973255; Fax: +86 931 8859764.
E-mail address: zhongai@nwnu.edu.cn (Zhong-ai Hu)

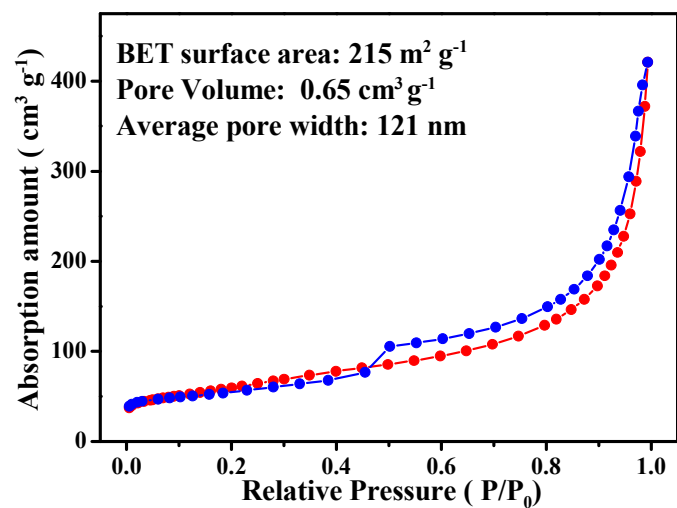


Fig. S1. Typical nitrogen sorption isotherms of SGHs.

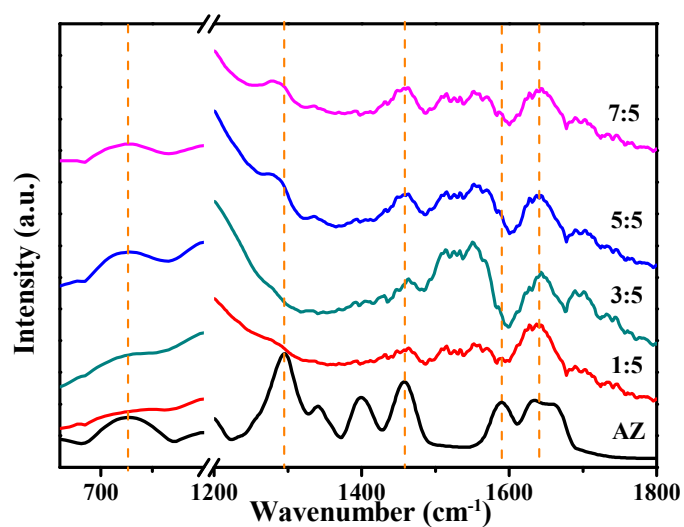


Fig. S2. FT-IR spectra of AZ and AZ@SGHs composite with different mass ratios of AZ (x) to SGHs (y).

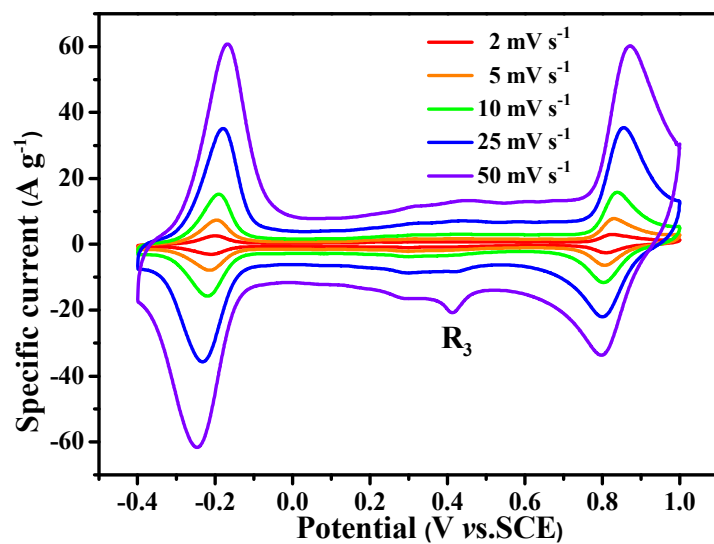


Fig. S3. CV curves of AZ@SGHs 3:5 at different scan rates in 1 mol L⁻¹ H₂SO₄ aqueous solution.

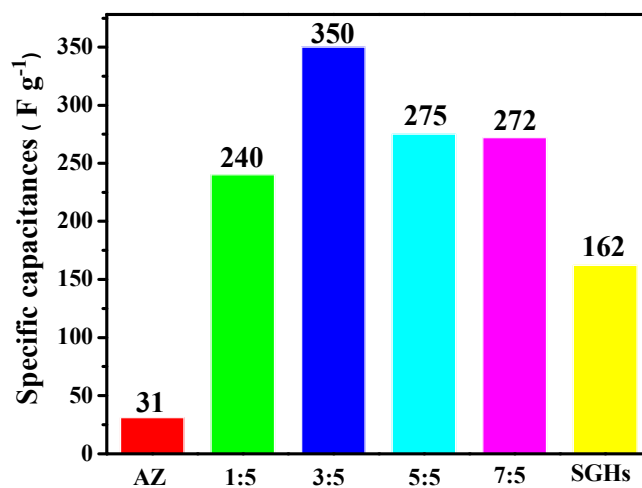


Fig. S4. The specific capacitance of pure AZ, SGHs and AZ@SGHs composites with different mass ratios of AZ (x) to SGHs (y).

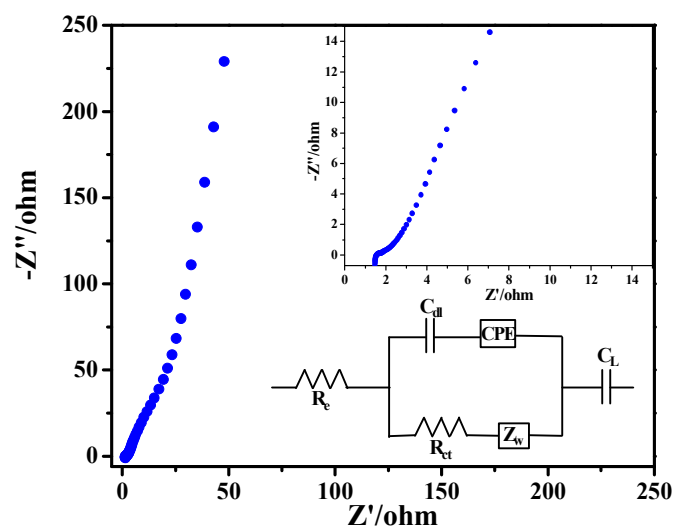


Figure S5. Nyquist plots of AZ@SGHs symmetric supercapacitors for two-electrode system (the inset of modeled equivalent circuit of electrochemical impedance spectroscopy).