

Electronic Supporting Information for

Chaos to order: an eco-friendly way to synthesize graphene quantum dots

Ying Huang, Chiyao Bai, Kecheng Cao, Yin Tian, Yue Luo, Chuanqin Xia, Songdong Ding, Yongdong Jin, Lijian Ma* and Shoujian Li*

College of chemistry, Sichuan University, Key of Radiation Physics and Technology, Sichuan University, Ministry of Education, Chengdu 610064, P. R. China.

- 1. Instruments**
- 2. Materials**
- 3. Yield and quantum yield**
- 4. Characterization**

1. Instruments

Fourier transform infrared spectroscopy (FTIR) was recorded with Perkin-Elmer IR-843 spectroscopy (USA).

Elemental compositions and chemical states of the surface elements on the materials were measured by X-ray photoelectron spectroscopy (XPS, XSAM800, UK). The products solutions were dropped on a silicon wafer and dried under vacuum condition.

Microwave irradiation was performed using a modified MIDEA MM721NH microwave machine.

X-ray diffraction (XRD) patterns were obtained by using a powder X-ray diffractometer (DX-1000, China).

Transmission electron microscopy (TEM) observations were performed on JEM-2100F. (JEOL, Japan)

Atomic force microscopic (AFM) images were taken using a MFP 3D (Asylum, USA) atomic force microscope.

Scanning electron microscopic (SEM) images were performed on a TESCAN VEGA3 microscope.

The photoluminescence (PL) spectra of GQDs in water were measured with a Horiba Jobin Yvon Fluoromax-4 spectrofluorometer with slit width of 5 mm.

The UV-Vis absorption was measured with a Shimadzu UV-2100 spectrophotometer.

2. Materials

Activated carbon and hydrogen peroxide were purchased from Aladdin Chemistry Co., Ltd. (China).

The dialysis bag was purchased from Union Carbide Corporation. (USA)

All reagents are of AR grade and without further purification.

The yield of GQDs is approximately 6.8%.

Table S1. Quantum yields of GQDs using quinine sulfate as reference.

Sample	Integrated emission intensity (I)	Abs. at 320 nm (A)	Refractive index of solvent (η)	Quantum yields (Φ)
GQDs	31483600	0.094	1.33	0.098
Quinine sulfate	86664670	0.46	1.33	0.55

Table S2. The impact of different power of microwave treatment

	200W	400W	600W	800W
Quantum yields	No product	No product	3.5%	9.8%

Table S3 The impact of different time of microwave treatment

	1.5 min	3.0 min	4.5 min	6.0 min	7.5 min	9.0 min
Quantum yields	No product	0.8%	2.6%	9.8%	9.2%	8.7%

3. Characterization

Table S4. XPS analysis of raw materials and microwave treated activated carbon.

	Atomic Conc %		Area		Ratio (sp^2/sp^3)
	O	C	C=C (sp^2)	C-C (sp^3)	
Raw materials	7.410	92.000	20035.950	18139.970	1.105
Microwaved	6.180	93.370	29206.540	19142.660	1.526

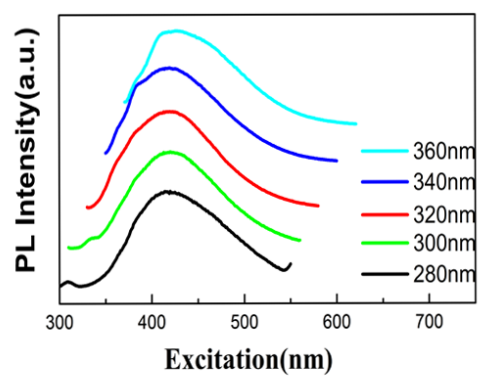


Fig. S1 PL emission spectra of GQDs.

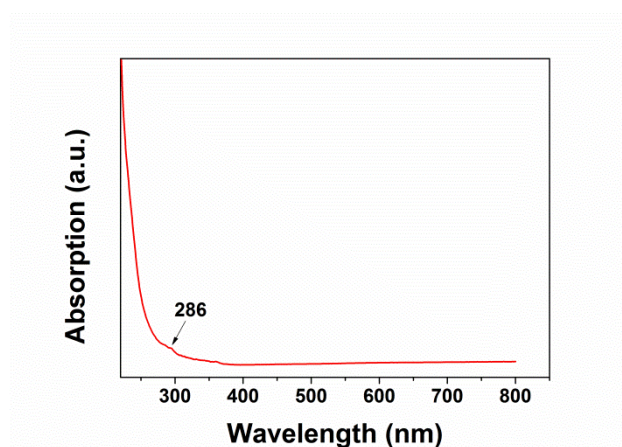


Fig. S2 UV-vis absorption spectrum of GQDs.

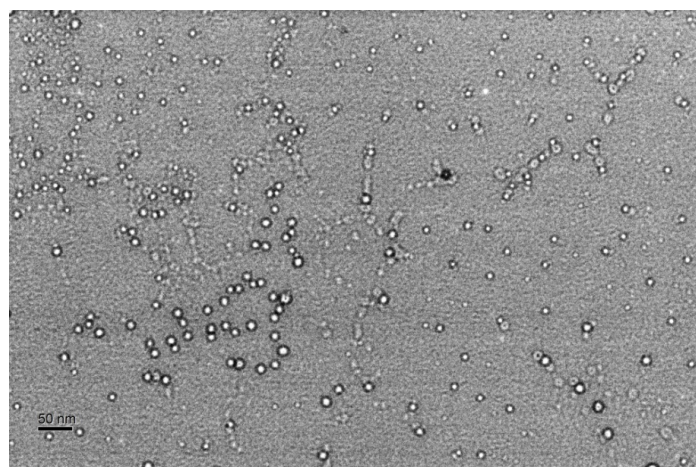


Fig. S3 TEM image after 3 months.

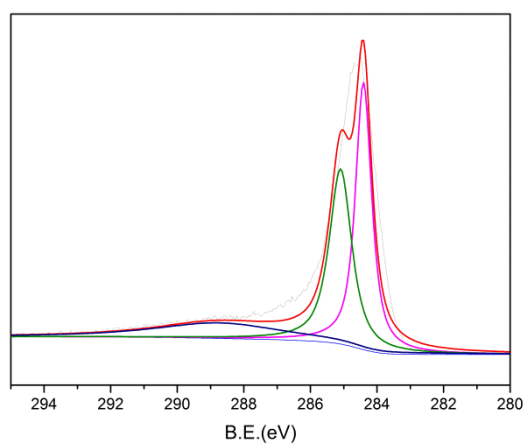


Fig. S4 C 1s peak in the XPS spectra of activated carbon.

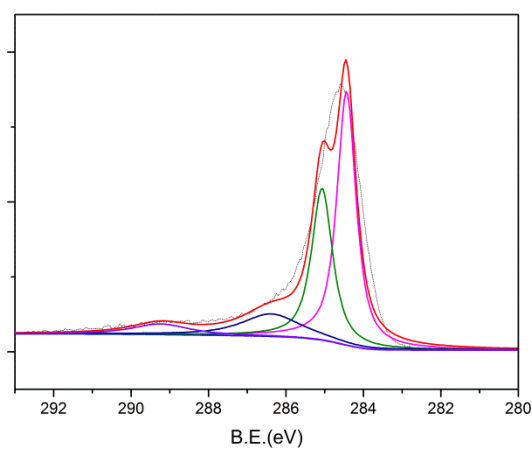


Fig. S5 C 1s peak in the XPS spectra of microwave treated activated carbon.

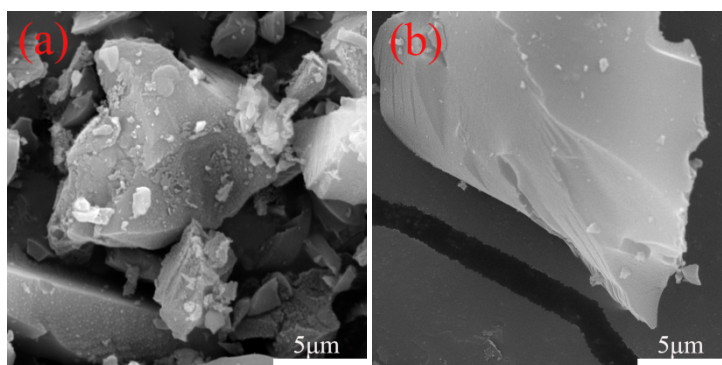


Fig. S6 SEM images of activated carbon (a. before, b. after microwave).