

Characterization

X-ray diffractometry (XRD: PANalytical x'pert Powder) was performed using Cu K α radiation of 40 kV. Fourier transform infrared spectrum (PerkinElmer, BRUKER) analysis was carried out in a FTIR-N3896. Raman measurements were performed with a LabRAM XploRA Raman spectrometer (HORIBA JobinYvon S.A.S) The thermal gravimetric (TG, NETZSCH) analysis was carried out by a STA-449C in a constant flow of Ar and the heating rate of 10°C/min. X-ray photoelectron spectra (XPS) were obtained on a Amicus spectrometer using monochromatic Al K α radiation. The field emission Scanning electron micrographs (FE-SEM) of the samples were obtained on a ZEISS Supra 55 SEM. Zeta potentials of sample dispersion at various pH values were investigated on a JS94H zeta potential analyzer. the contact angle of the samples were obtained on a HARKR-WDA contact angle measurement instrument.

Materials

Flake graphite of 400 mesh were purchased from Meilikun Co. Ltd (qingdao, China). Aqueous ammonia (28 wt%), potassium permanganate and 98 wt% H₂SO₄ were bought from Fengchuan Chem. Co. Ltd (Tianjin, China). silver nitrate and Selectfluor were from Aladdin Co. Ltd (shanghai, China). All the reagents were used as received without further purification.

Preparation of GOCOOH^[1]

GO was prepared by a modified Hummers' method^[2]. GO aqueous suspension (1 mg/mL , 250 mL) was dispersed into ultrasonic treatment was carried out for 1 h. After the GO was entirely dispersed, sodium hydroxide (NaOH, 10 g) and sodium

chloroacetate ($\text{ClCH}_2\text{COONa}$, 14 g) were added to the GO suspension and a magnetic stirring at room temperature for 12 hours, and the pH of the solution was adjusted to 5-6 by dilute hydrochloric acid. Then the mixture was filtered and washed with anhydrous ethanol and a large amount of distilled water in sequence. Then the samples were collected and dialyzed against distilled water for 2 days to remove any impurities. To prepare freeze-dried GOCOOH , the obtained GO colloid was directly subjected to freeze-drying for 24 h on a vacuum freeze dryer.

Preparation of GOF

To a stirred solution of GOCOOH (20 mg) in distilled water (50 mL) was added selectfluor (100 mg) and silver nitrate (10 mg), and the reaction mixture was stirred at 90°C for 10 h under an atmosphere of nitrogen. Then the mixture was filtered under vacuum, and the filtrate was extracted with ethyl acetate (3×15 mL) to remove organic impurities. Then the water layer was repeated centrifugation for 15 min at 8000 rpm until the silver ion has not been detected in the process. Then the samples were collected and dialyzed against distilled water for 2 days to remove any impurities. The obtained GOF colloid was directly subjected to freeze-drying for 24 h on a vacuum freeze dryer for 24 h on a vacuum freeze dryer.

References

- [1] X. Sun, Z. Liu, K. Welsher, J. T. Robinson, A. Goodwin, S. Zaric and H. Dai, *Nano. Res.* 2008, **1**, 203.
- [2] G. Wang, L-T. Jia, Y. Zhu, B. Hou, D-B. Li and Y-H. Sun, *RSC Advances*, 2012, **2**, 11249.