Electronic Supplemental Information

γ-irradiation induced one-step synthesis of electromagnetic functionalized reduced graphene oxide-Ni nanocomposites

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Experimental Details:

Preparation of RGO and RGO/Ni nanocomposites. Graphite oxide (GO) was prepared with expansible graphite according to the method described in the literature.[1]Fabrication of RGO-Ni nanocomposite was carried out in an aqueous system, where simultaneous reduction of GO and Ni^{2+}ions occurred under gamma-irradiation with ^{60}Co radiation source. 0.5 g GO was dissolved in 100 mL distilled water, then about 1.24 g $Ni(CH_3COO)_2 \cdot 6H_2O$and 10 mL isopropanol was added in sequence. The mixture was treated by ultrasonication, and nitrogen was bubbled in the solution to remove dissolved oxygen.The solution was then sealed and irradiated under ^{60}Co with a dose of 19kGy/h for 10 h. The final product was collected by centrifugation with distilled water and ethanol for 5 times respectively, and then dried at 50^{o}Cunder vacuum condition. RGO was prepared under the same procedure without the presence of Ni^{2+} ions.

Characterization. Powder X ray diffraction (XRD) patterns of the samples were obtained on an XRD-6000 (Shimadzu) using a Cu Kα source (λ=0.154056 nm). Transmission electron microscope(TEM, Tecnai G2 F20) and Scanning electron microscope (SEM, FEI Quanta

200F)was applied to observed the particle size and surface morphology of the composite. The Raman spectra of the samples were measured using a RenishawInVia confocal microscope Raman system, with a 533 nm laser. Magnetic property of RGO-Ni nanocomposite was performed on aLake Shore 7404vibrating sample magnetometer (VSM) at room temperature.The electromagnetic parameters of the as-prepared sampleswerecollected on an HP-8722ES network vector analyzer in the range of 2-18 GHz.

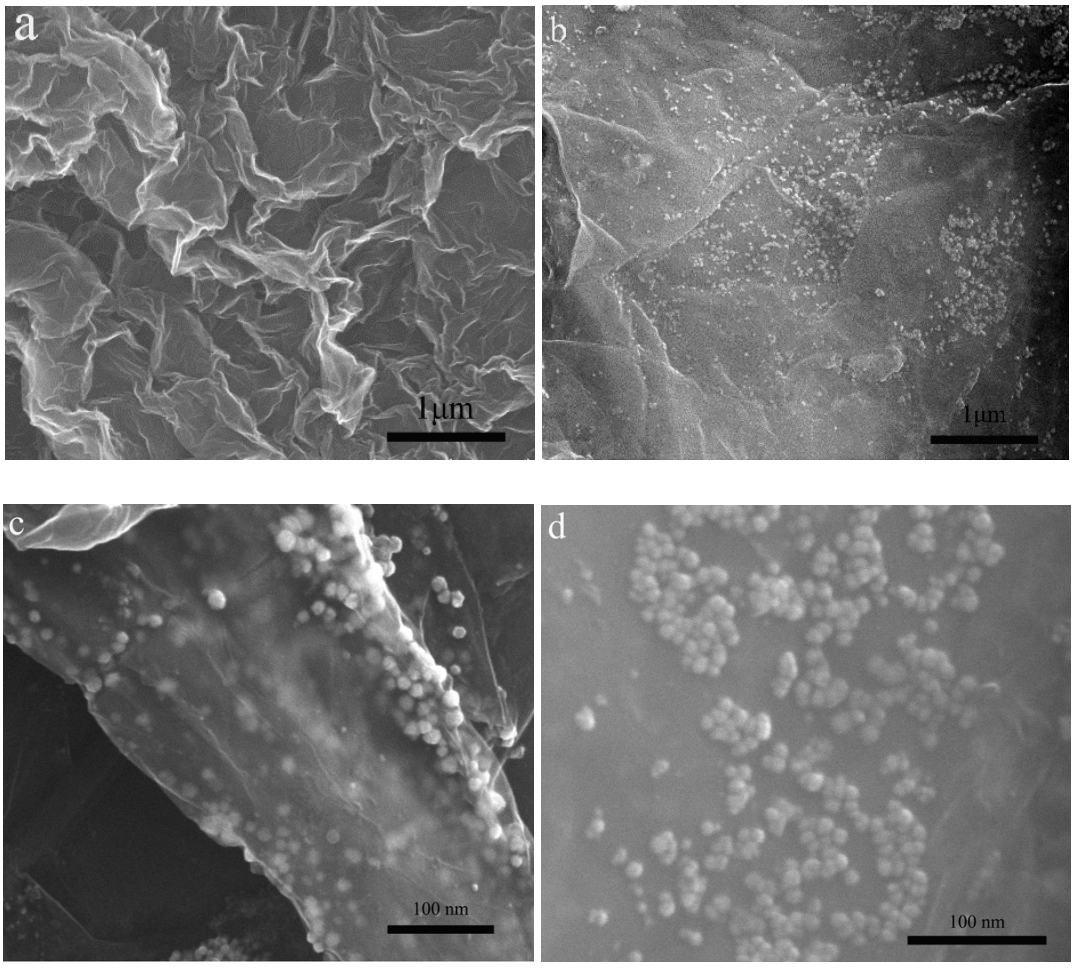

Fig. S1. SEM image of RGO(a) and RGO-Ni composite at different magnifications(b-d).

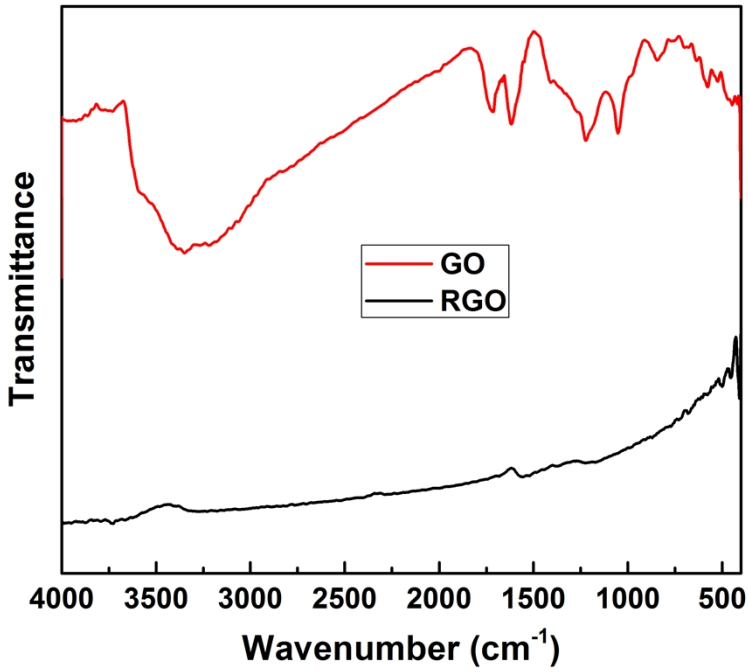

Fig. S2. FT-IR spectra of the as-prepared GO and RGO.

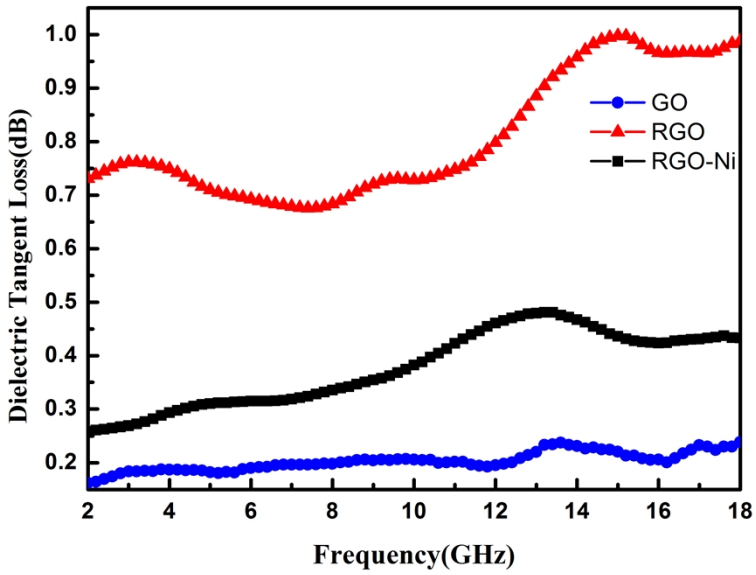

Fig. S3. Dielectric tangent loss of the as-prepared GO, RGO and RGO-Ni samples.

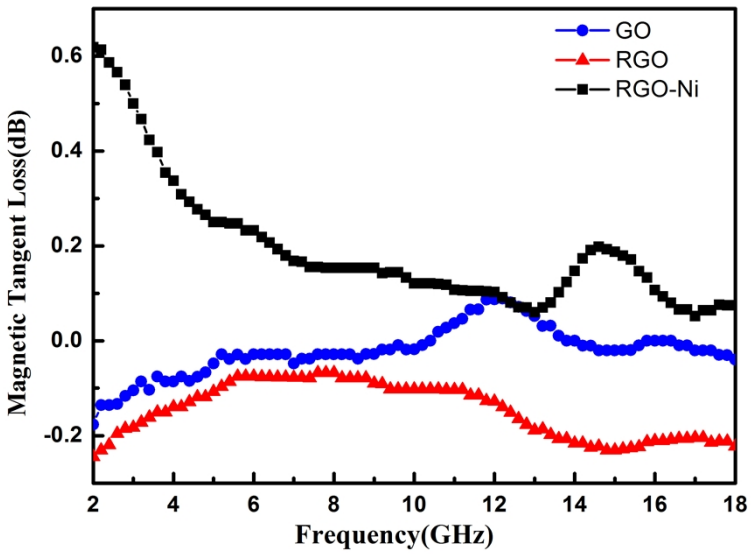

Fig. S4. Magnetic tangent loss of the as-prepared GO, RGO and RGO-Ni samples.

1. C. Bao, L. Song, W. Xing, B. Yuan, C. A. Wilkie, J. Huang, Y. Guo and Y. Hu, *Journal of Materials Chemistry*, 2012, **22**, 6088-6096.