Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

One-Pot Synthesis of $CoFe_2O_4$/Graphene Oxide Hybrids and Their Conversion into FeCo/Graphene Hybrids for Lightweight and High Efficient Microwave Absorber

Xinghua Li, Juan Feng, Yaping Du, Jintao Bai, Haiming Fan, Haoli Zhang, Yong Peng*, Fashen Li*

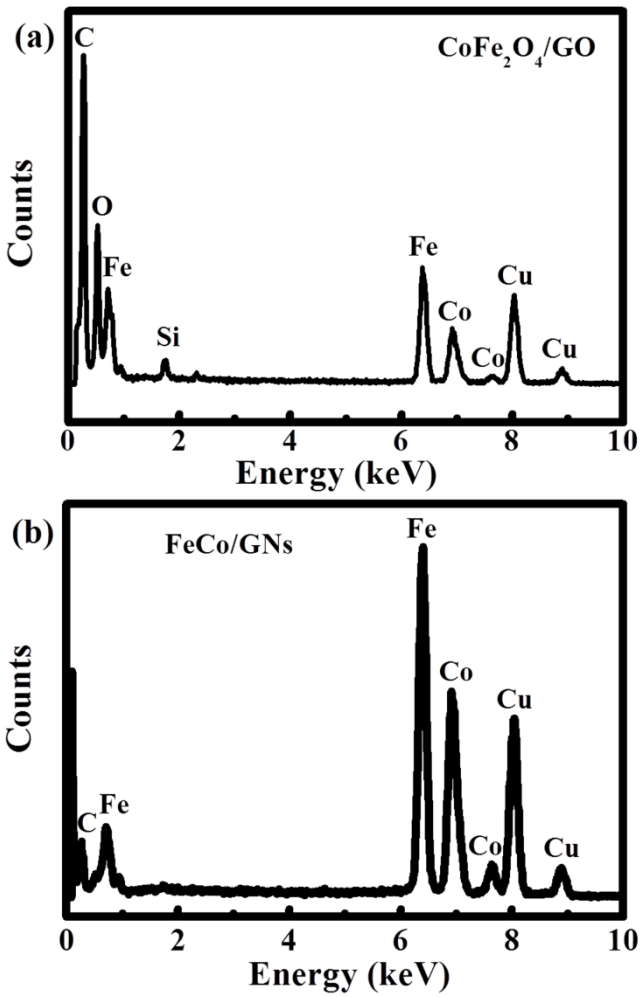

Figure S1 EDX spectra of (a) $CoFe_2O_4$/GO and (b) FeCo/graphene hybrids

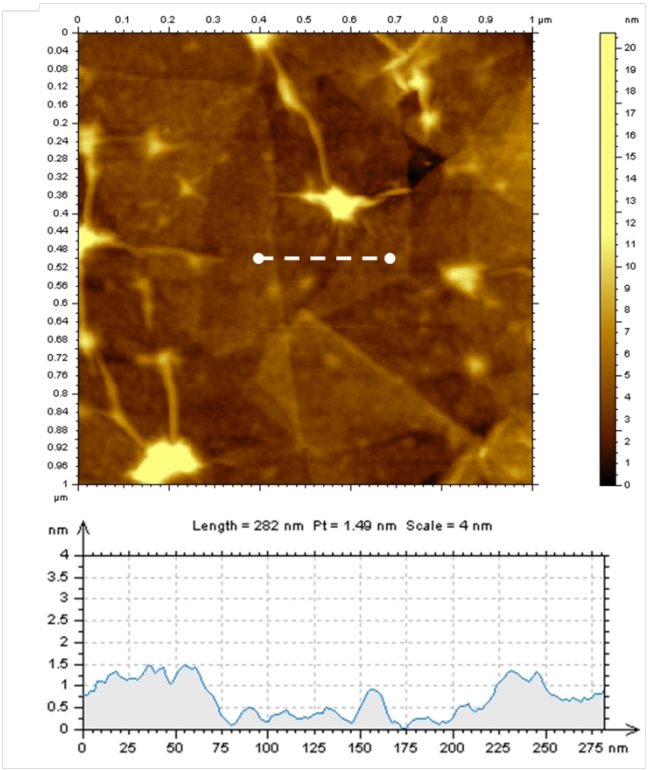

Figure S2 AFM image of GO

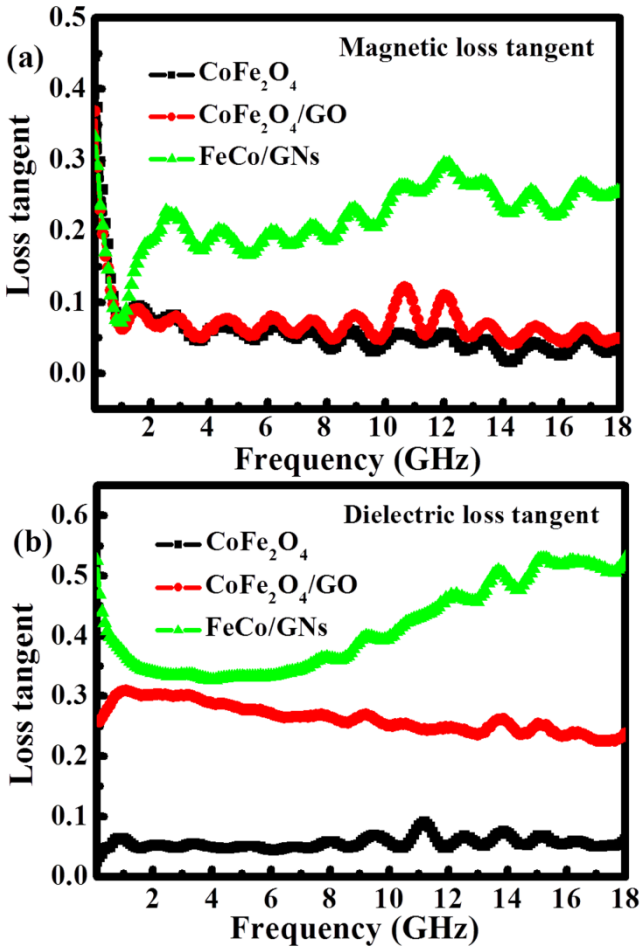

Figure S3 Frequency dependence of (a) magnetic loss tangent and (b) dielectric loss tangent of pure $CoFe_2O_4$ nanocrystals, $CoFe_2O_4$/GO and FeCo/graphene hybrids

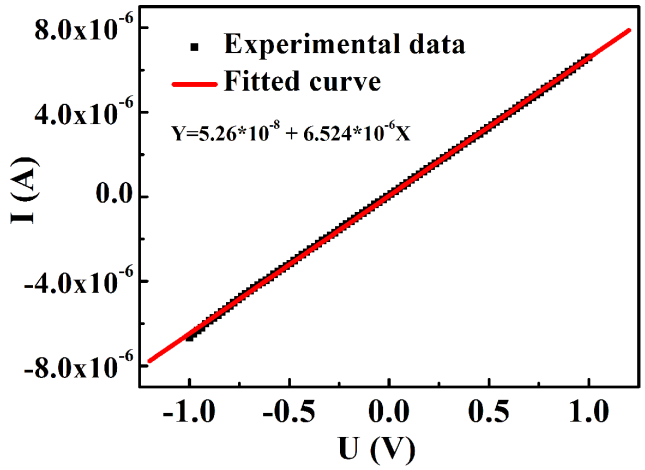

Fig. S4 The U-I curve for the $CoFe_2O_4$/GO hybrids

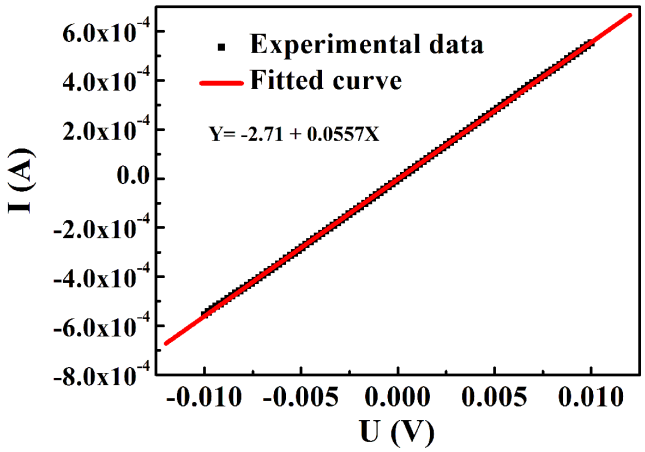

Fig. S5 The U-I curve for the FeCo/GNs hybrids

We have measured the conductivity by four-point probe technique, a standard programmable DC voltage/current detector. Both the $CoFe_2O_4$/GO and FeCo/GNs hybrids were pressed into toroidal shape with outer diameter of 7.00 mm and inner diameter of 3.04 mm for the measurment of theirconductivities. The thickness of $CoFe_2O_4$/GO and FeCo/GNs hybrids is 3.96 mm and 1.28 mm, respectively. Fig. S4 and S5 show the U-I curves for the $CoFe_2O_4$/GO and FeCo/GNs hybrids, respectively. It is clear that both the curves show the linear relationship. The conductivities (σ) for the $CoFe_2O_4$/GO and FeCo/GNs hybrids are calculated to be about 8.28×10^{-4} and 2.93 S m^{-1}, respectively.

The skin depth (δ) of the $CoFe_2O_4$/GO and FeCo/GNs hybrids were obtained using the following equation:

$$\delta = \sqrt{\frac{1}{\pi f \mu_0 \mu_i \sigma}}$$

Where f is the frequency, μ_0 is is the permeability of vacuum ($4\pi\times10^{-7}$), μ_i is the relative permeability of hybrids and σ is the conductivity.

Here, we calculated the skin depth (δ) with the frequency at 1 GHz. Besides, we estimate the skin depth of the hybrids using the relative complex permeability of the paraffin-containing composite, since the contained paraffin doesn't influence the order of the complex permeability.

For $CoFe_2O_4$/GO hybrids, μ_i is about 1.24 at 1GHz. The skin depth (δ) is about 0. 5 m.

For FeCo/GNs hybrids, μ_i is about 1.82 at 1GHz. The skin depth (δ) is about 7×10^{-3} m.