Electronic Supplementary Information (ESI)

Functional nanoparticle-decorated graphene oxide sheets as stabilizers for Pickering high internal phase emulsions and graphene oxide based foam monoliths

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Fabrication of TiO_2 and Mn_3O_4 nanoparticle-decorated GO sheets

TiO_2 nanoparticle-decorated GO sheets: 2 mL of the as-prepared GO aqueous suspension was adjusted to pH 5.0 by adding EDA. Next, 17 μL of aqueous titanium trichloride ($TiCl_3$) containing 30 mg of $TiCl_3$ was mixed into the GO aqueous suspension. Furthermore, the mixture was reacted for 5 min at room temperature to obtain TiO_2 nanoparticle-decorated GO suspension.

Mn_3O_4 nanoparticle-decorated GO sheets: 2 mL of the as-prepared GO aqueous suspension was adjusted to pH 7.0 by adding EDA. Next, 30 mg of $MnCl_2$ was added into the GO suspension, and the system was reacted for 5 min at room temperature to obtain Mn_3O_4 nanoparticle-decorated GO suspension.

For further characterization, the prepared nanoparticle-decorated GO suspensions were centrifugally washed five times with water, followed by freeze-drying to obtain the dried nanoparticle-decorated GO.

Table S1. Parameters of toluene-in-water emulsions prepared under different conditions.

Sample	GO (mg mL^{-1})	pH modifier	$FeCl_2$ (mg mL^{-1})	Can form HIPE?
1	3	EDA	37.5	Yes
2	3	EDA	31.25	Yes
3	3	EDA	25	Yes
4	3	EDA	18.75	Yes
5	3	EDA	12.5	Yes
6	3	EDA	6.25	No
7	3	EDA	0	No
8	0.75	EDA	12.5	No
9	1.5	EDA	12.5	No
10	6	EDA	12.5	No
11	9	EDA	12.5	No
12	3	EDA	12.5 mg mL^{-1} Fe_3O_4	No
13	3	DETA	12.5	No
14	3	NaOH	12.5	No
15	3	$NH_3 \cdot H_2O$	12.5	No

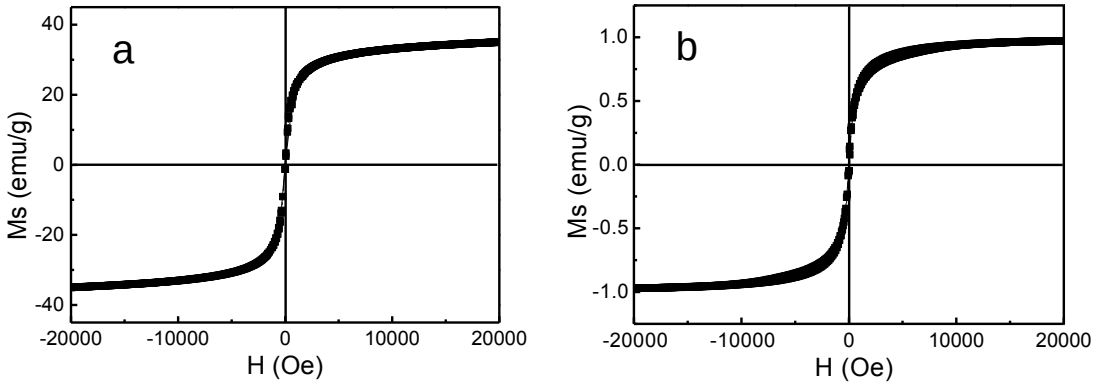

Fig. S1. Magnetization curves of (a) Fe_3O_4 nanoparticle-decorated GO and (b) porous Fe_3O_4 nanoparticle-decorated GO/PMF foams.

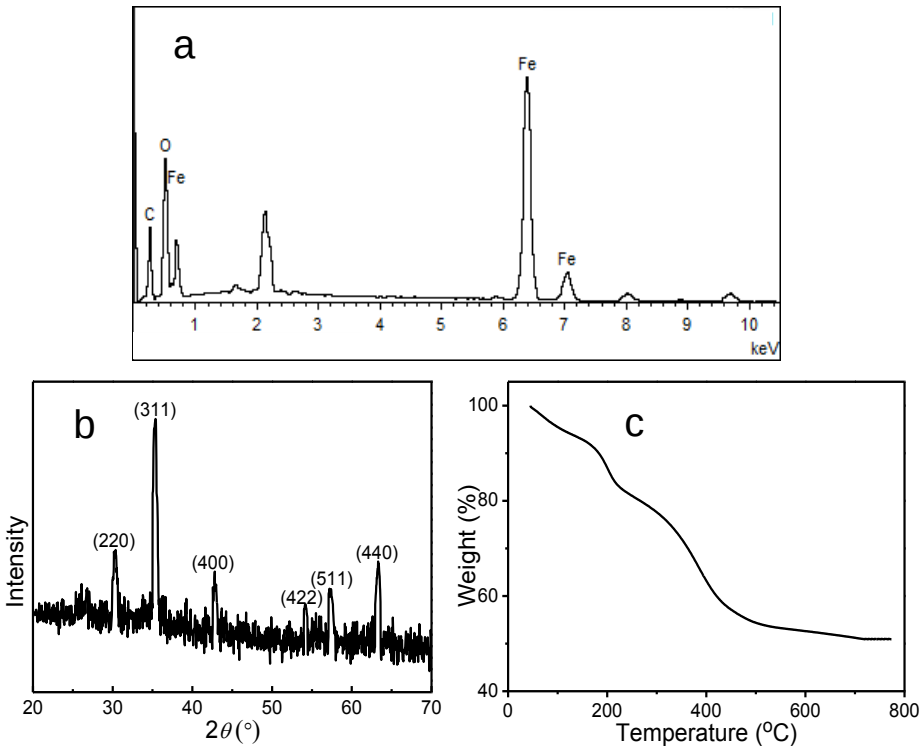

Fig. S2. (a) EDS spectrum, (b) XRD pattern and (c) TGA curve of Fe_3O_4 nanoparticle-decorated GO.

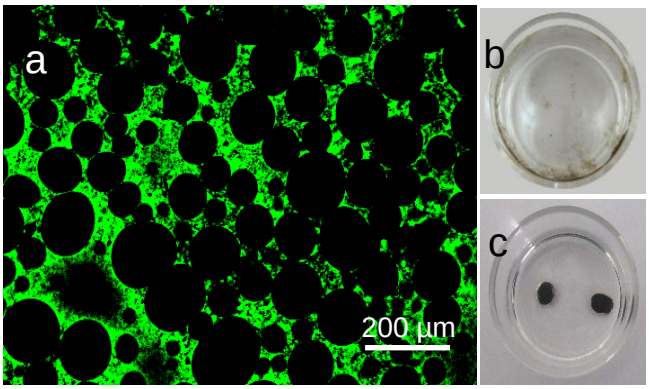

Fig. S3. (a) Fluorescence micrograph of toluene-in-water Pickering HIPE stabilized by Fe_3O_4 nanoparticle-decorated GO sheets. Digital photographs of drop test of the Pickering HIPE dispersing in (b) water and (c) toluene. The internal phase fraction of Pickering HIPE is 80 vol%.

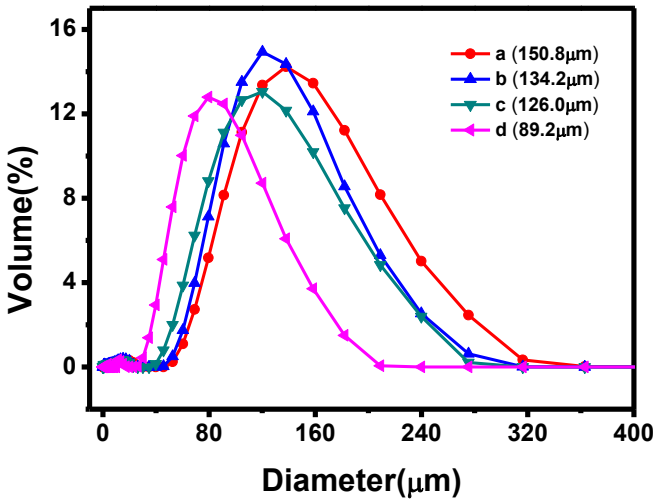

Fig. S4. The size distribution graphs of toluene-in-water Pickering HIPEs stabilized by Fe_3O_4 nanoparticle-decorated GO sheets formed with different concentration of $FeCl_2$: (a) 18.75, (b) 25, (c) 31.25, and (d) 37.5 mg mL^{-1}. The GO sheet concentration in aqueous suspension is 3 mg mL^{-1}. The internal phase fraction of the emulsions is 75 vol%.

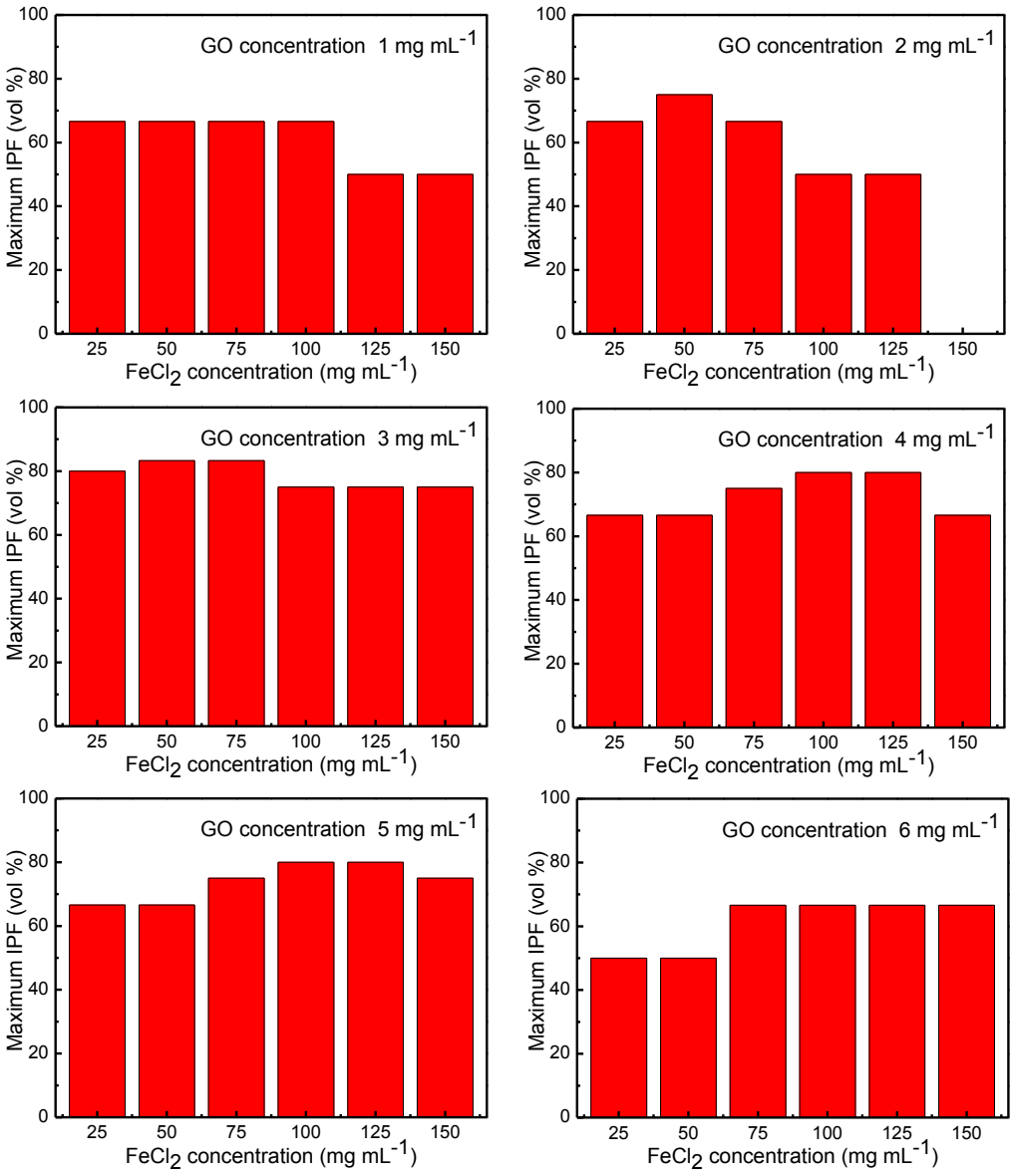

Fig. S5. The maximum internal phase fractions (IPFs) of toluene-in-water emulsions prepared with various GO concentrations and $FeCl_2$ concentrations.

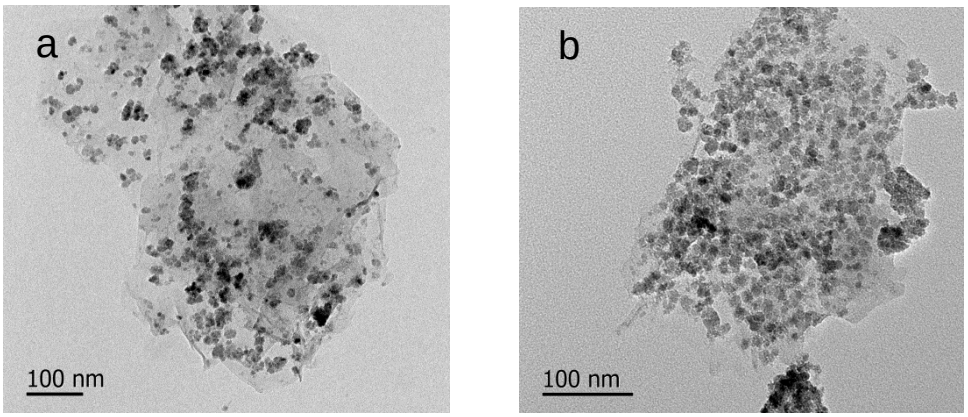

Fig. S6. TEM images of (a) TiO_2 and (b) Mn_3O_4 nanoparticle-decorated GO sheets.

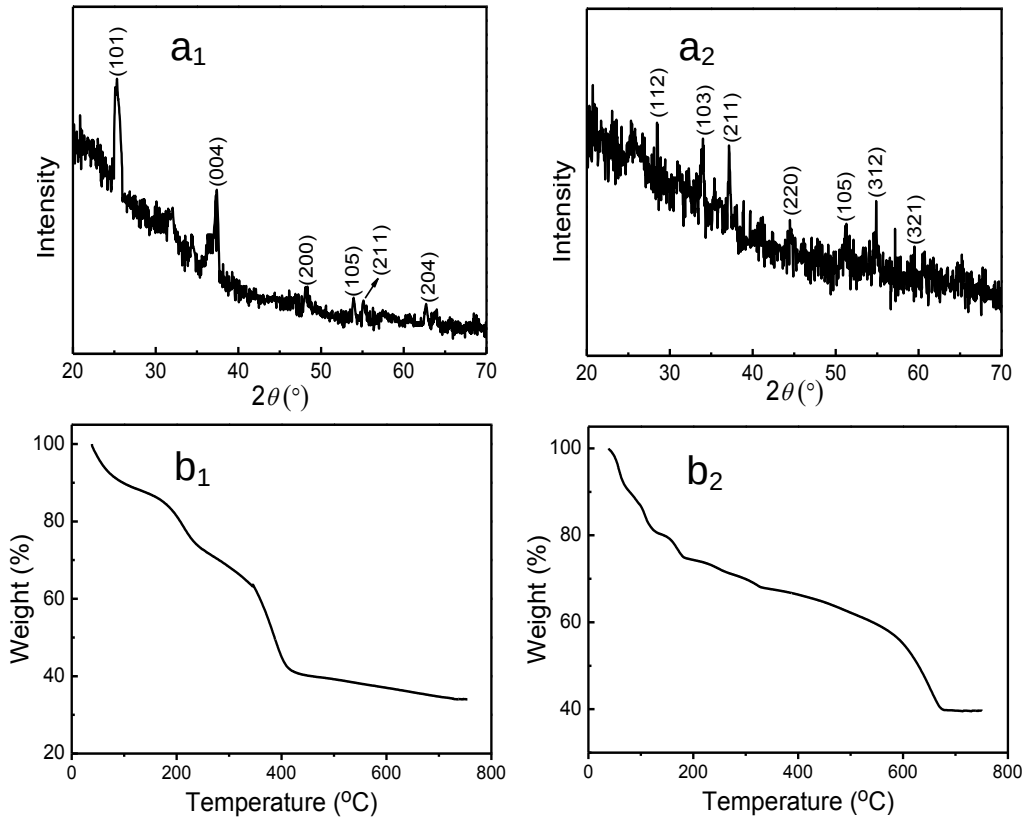

Fig. S7. XRD patterns of (a_1) TiO_2 and (a_2) Mn_3O_4 nanoparticle-decorated GO sheets. TGA curves of (b_1) TiO_2 and (b_2) Mn_3O_4 nanoparticle-decorated GO sheets.

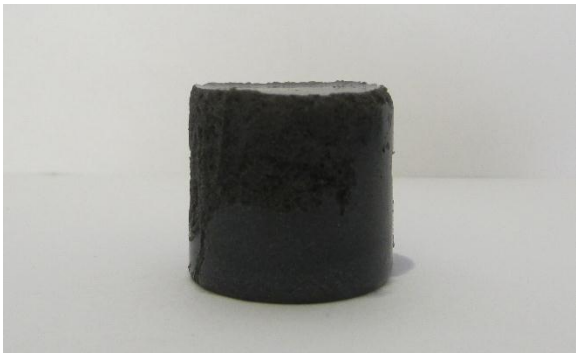

Fig. S8. Digital photograph of porous nanoparticle-decorated GO/PMF foam.

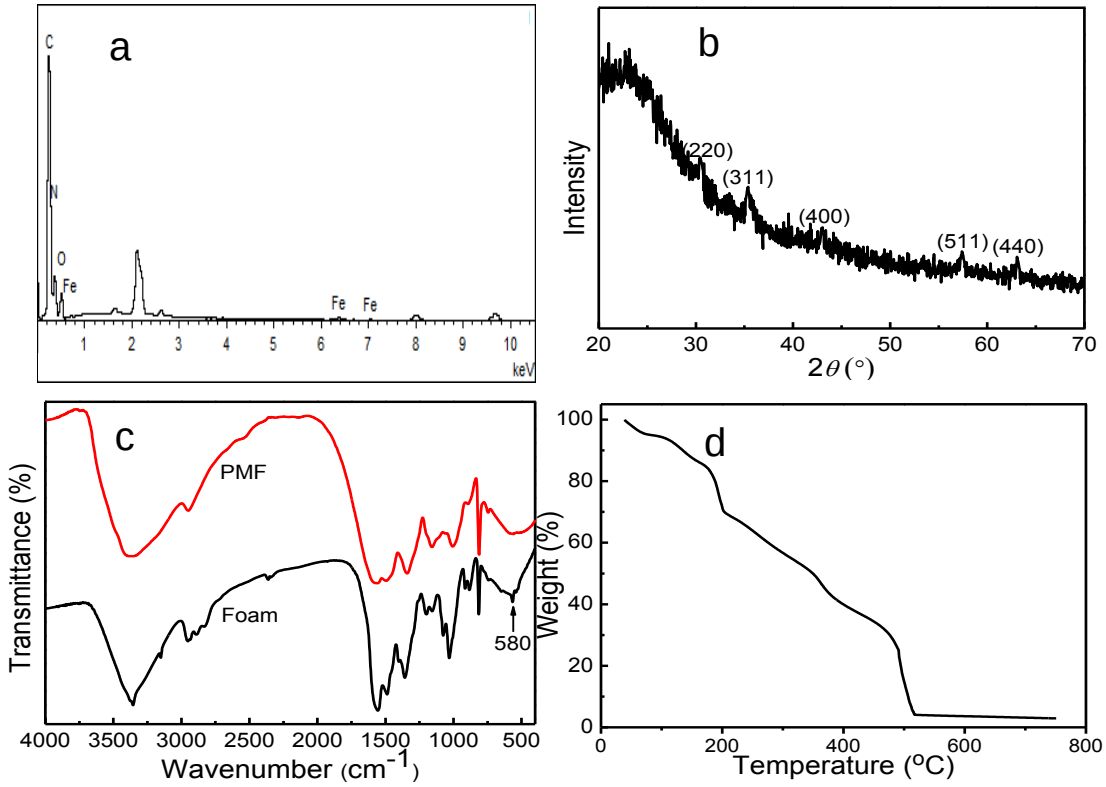

Fig. S9. (a) EDS spectrum and (b) XRD pattern of porous Fe_3O_4 nanoparticle-decorated GO/PMF foam. (c) FTIR spectrum of pure PMF and porous Fe_3O_4 nanoparticle-decorated GO/PMF foam. (d) TGA curve of porous Fe_3O_4 nanoparticle-decorated GO/PMF foam.