

Electronic Supplementary Information

Pickering emulsion polymerized smart magnetic poly(methyl methacrylate)/Fe₂O₃ composite particles and their stimuli-response

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Experimental

Characterization

Both the Fe₂O₃ nanoparticles used and Pickering emulsion droplets were observed by transmission electron microscopy (TEM) (Philips CM200) and optical microscopy (OM) (Olympus BX51), respectively. The size and size distribution of the Fe₂O₃ nanoparticles and PMMA/Fe₂O₃ composite particles were determined by dynamic light scattering (DLS) (Photal ELS-8000). Mn and polydispersity index (PDI) of the PMMA produced by Pickering emulsion were determined by gel permeation chromatography (GPC) (Young Lin SP930D) coupled with an RI detector (RI 750F) and two columns (GPC KD-806 M x 2, Shodex). The eluent used was tetrahydrofuran (THF) at 40 °C and the flow rate was 1.0 mL/min.

Results and discussion

Fig. S1 shows the shape and size of the Fe₂O₃ nanoparticles. Fe₂O₃ nanoparticles have angled edge, random shape and wide diameter range. These random size particles affect to size of the emulsion droplet.⁵⁰

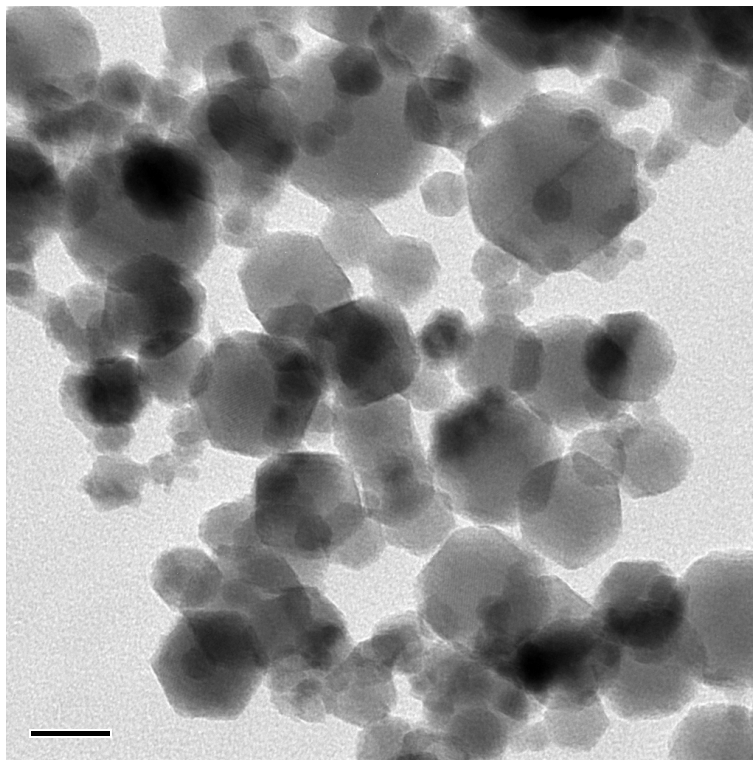


Fig. S1 TEM image of the Fe₂O₃ nanoparticles.

Fig. S2 shows the size distribution of the Fe₂O₃ nanoparticles (a) and PMMA/Fe₂O₃ composite particles measured by dynamic light scattering (DLS). The average size of the Fe₂O₃ nanoparticles and PMMA/Fe₂O₃ composite particles is 36 nm, 275 nm respectively.

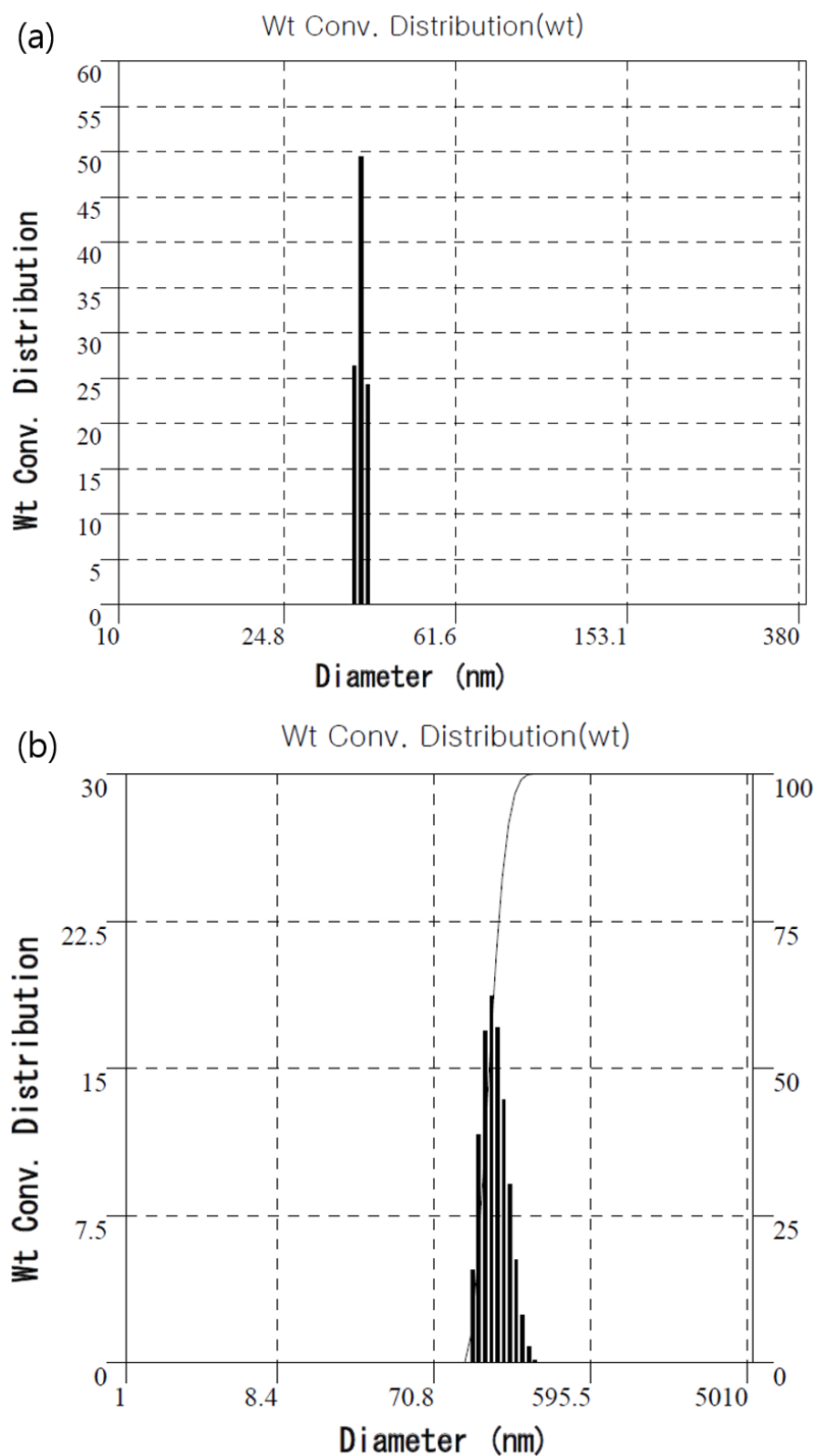


Fig. S2 Particle size distribution of the Fe₂O₃ nanoparticles (a) and PMMA/Fe₂O₃ composite particles.

Optical image of the Pickering emulsions prepared from Fe₂O₃ nanoparticles before polymerization is shown in Fig. S3. They are methylmethacrylate (MMA) monomers in aqueous emulsions stabilized by Fe₂O₃ nanoparticles. From the image, emulsion droplets observed to be with a wide size range from 0.5 μ m to 8 μ m.

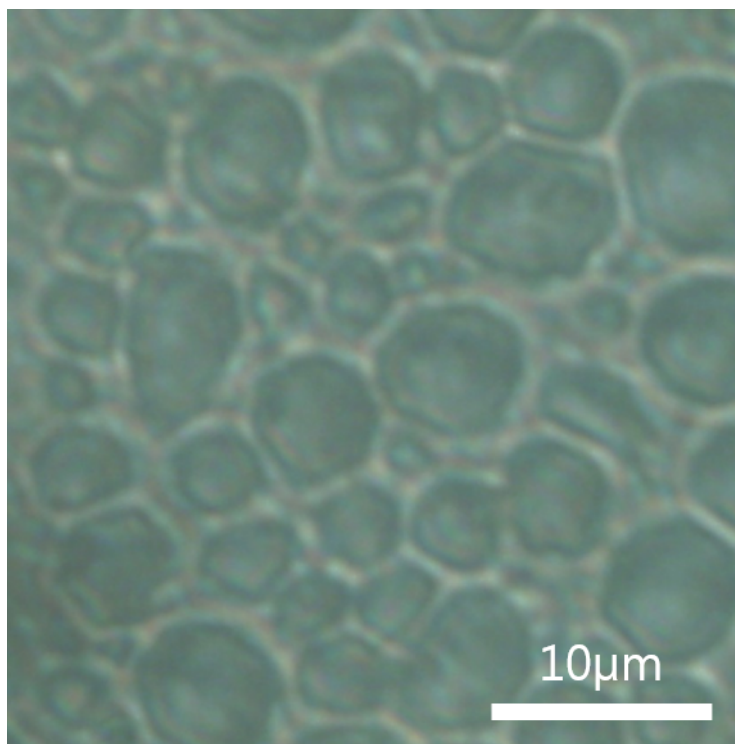


Fig. S3 Optical microscope image of the MMA drops surrounded by Fe₂O₃ nanoparticles.

Fig. S4 shows the evolution of the GPC traces for the PMMA extracted from the PMMA/Fe₂O₃ composites. The number averaged molecular weight (M_n) of the PMMA was 247000 g/mol and the PDI was 2.64.

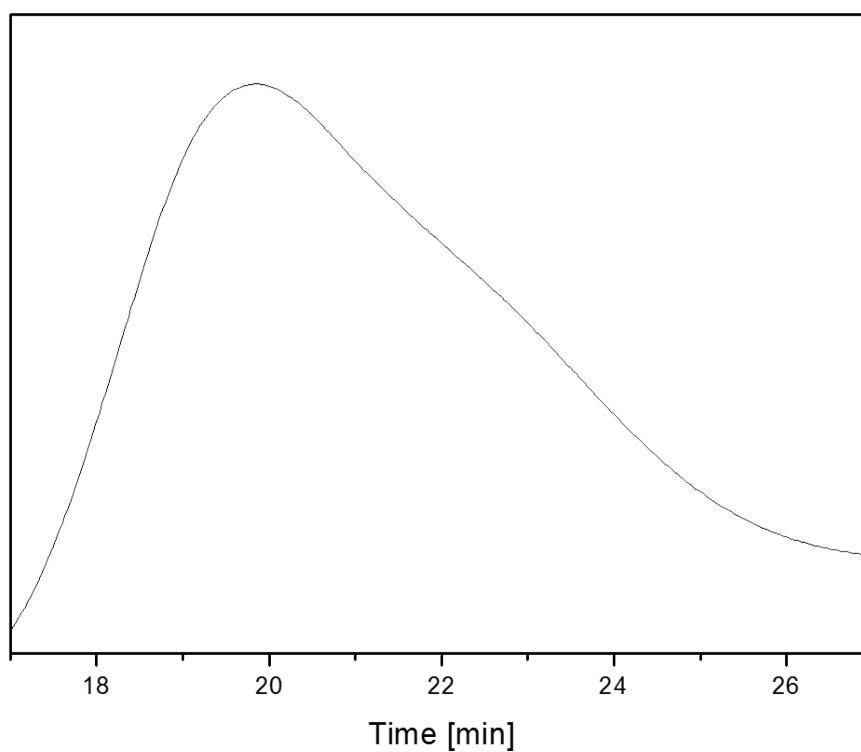


Fig. S4 Evolution of the GPC traces of PMMA in the PMMA/Fe₂O₃ composite.

Reference

51 B. P. Binks and S. O. Lumsdon, *Langmuir*, 2001, **17**, 4540