

Electronic Supplementary Information

Design and fabrication of hollow, magnetic and fluorescent CdS/Magnetite/Poly(styrene-co-methyl methacrylate) microspheres

Song Yang, Huarong Liu*, Zhicheng Zhang

Department of Polymer Science and Engineering, Key Laboratory of Soft Matter

Chemistry, University of Science and Technology of China, Hefei, Anhui 230026, P. R.

China

To whom correspondence should be addressed. E-mail: hrliu@ustc.edu.cn; Tel: +86-551-3601586; Fax: +86-551-3601592.

Fig. S1 shows the TGA curves of as-synthesized HMPM and CMPM. For HMPM (see Figure 6a), the initial weight loss of 1.29% (up to 160 °C) is due to the evaporation of physically adsorbed water, and the subsequent loss of 3.49% (160-300 °C) is due to the decomposition of residual surfactant and co-stabilizer. Between 300 and 600°C, a weight loss of 47.06% is attributed to removal of the poly(St-co-MMA). The residual weight of 48.16% should be that of the pure magnetite nanoparticles. So we can estimate that the magnetite content is 50.58% ($48.16/95.22 \times 100\%$) for HMPM. From Figure 6b of CMPM, the initial weight loss of 2.50% (up to 160 °C) is due to the evaporation of physically adsorbed water, and the subsequent loss of 4.54% (160-300 °C) is due to the decomposition of residual surfactant and co-stabilizer. The weight loss of 24.35% between 300-600°C is due to removal of poly(St-co-MMA). The residual weight of 68.61% should be that of the inorganic content (include Fe₃O₄ and CdS). So we can estimate that the inorganic content is 73.81% ($68.61/92.96 \times 100\%$) for CMPM. The CdS content of CMPM is estimated at 47.01%. We can assume that the content of CdS of CMPM is x. Then, $(0.5058+x)/(1+x)$ should be 0.7381. So, we can calculate the value of x is 0.887. Finally, the CdS content of CMPM is gained by $x/(1+x)$, namely, 47.01%.

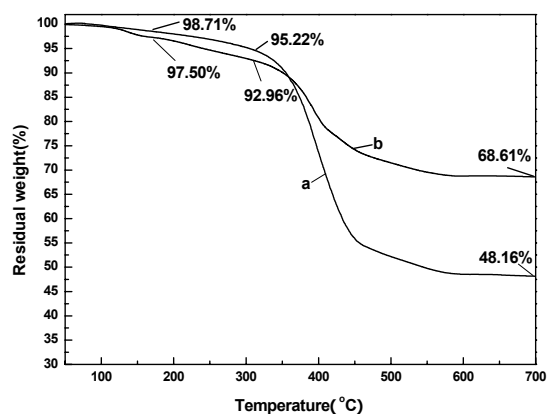


Fig. S1. TGA curves of (a) HMPM; (b) CMPM.

Fig. S2 shows the absorption spectrum of CMPM dispersed in ethanol by sonication. It displays a clear maximum absorption peak at 442 nm, which is assigned to the optical transition of the first excitonic state of the CdS nanoparticles. Obviously, the explicit blue shift of the absorption peak from ~515nm for bulk CdS occurs owing to the small size of the CdS quantum dots located at the surface of CMPM. Estimation based on the absorption maximum at 442 nm reveals that the mean diameter of the CdS nanoparticles is ~4 nm¹ which is in good agreement with the result obtained from XRD.

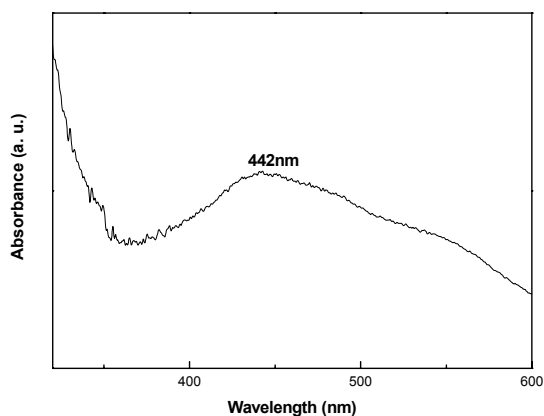


Fig. S2. Uv-vis absorption spectrum of CMPM.

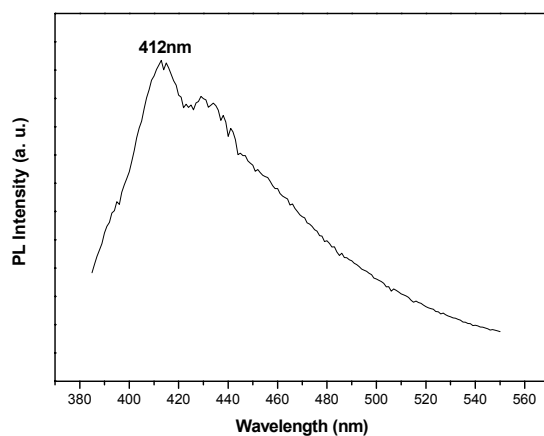


Fig. S3. PL spectrum of ethanol ($\lambda_{\text{ex}} = 350\text{nm}$).

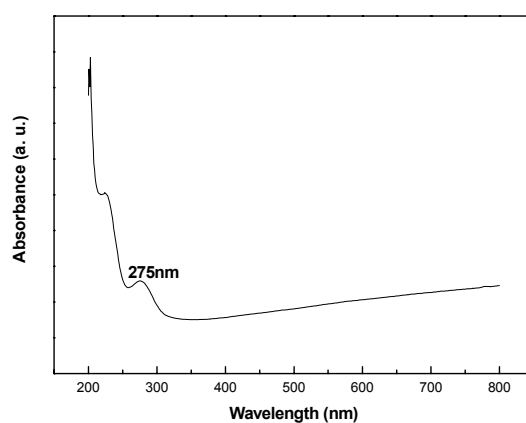


Fig. S4. Uv-vis absorption spectrum of magnetite nanoparticles.

References

- 1 H. Weller, *Angew. Chem.-Int. Edit.* 1993, **32**, 41.