Supplementary material (ESI) for Journal of Materials Chemistry

Supplementary Information

A Simple Method to Synthesize Multifunctional Silica Nanocomposites, NP@SiO_2, Using Polyvinylpyrrolidone (PVP) as a Mediator

Jinmyung Cha, Cui Ping, and Jin-Kyu Lee*

Department of Chemistry, Seoul National University, Seoul, Korea

E-mail: jinklee@snu.ac.kr

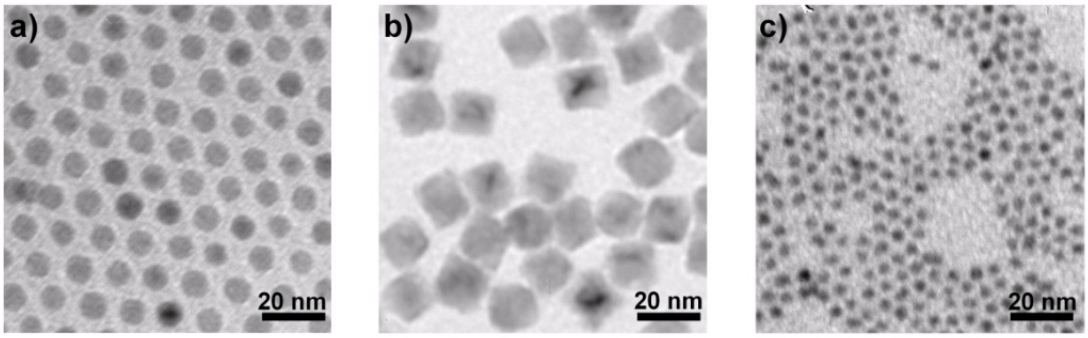

Figure SI 1. TEM images of a) Fe_3O_4 nanoparticles, b) MnO nanoparticles, and c) CdSe/ZnSe quantum dots.

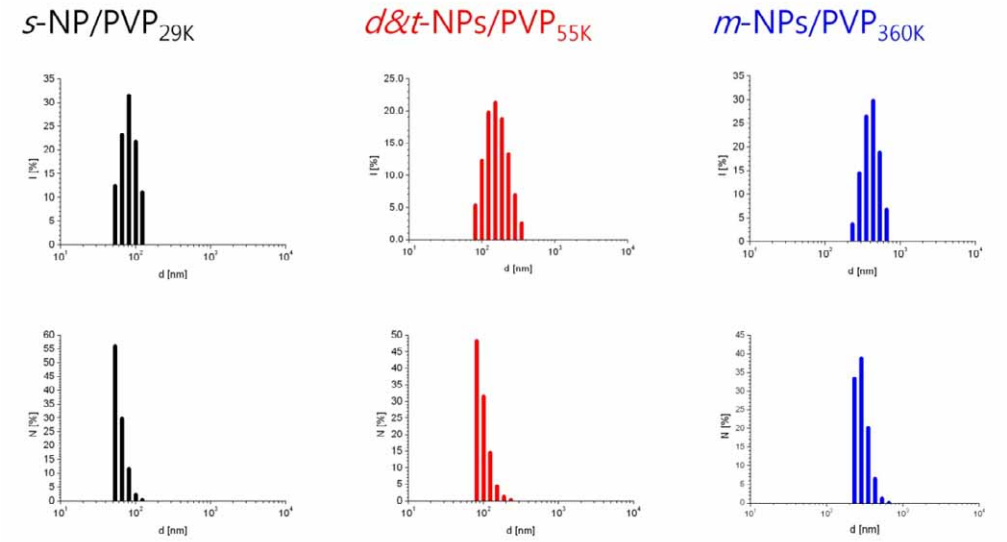

Figure SI 2. The size distribution of NPs/PVP in Figure 2a-c measured by light scattering method

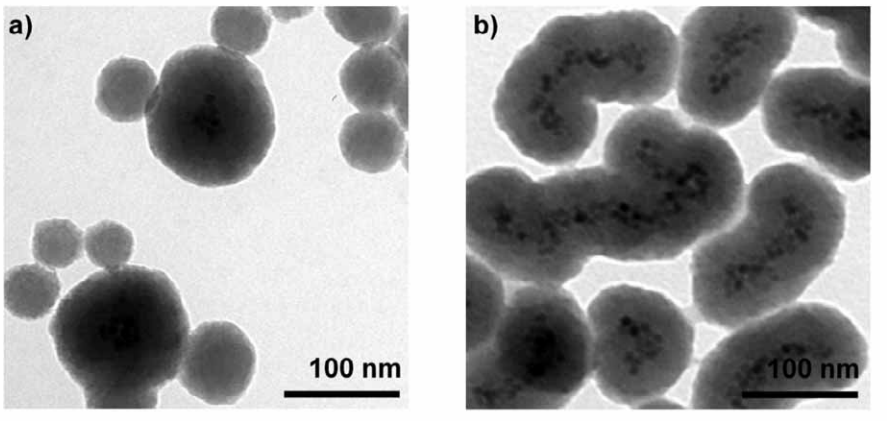

Figure SI 3. TEM images indicating the formation of a) empty silica particles at low concentrations (1 mgmL^{-1}) of *m*-Fe_3O_4/PVP and b) chain-shaped silica nanocomposites at high concentrations (over 5 mgmL^{-1}) of *m*-Fe_3O_4/PVP.

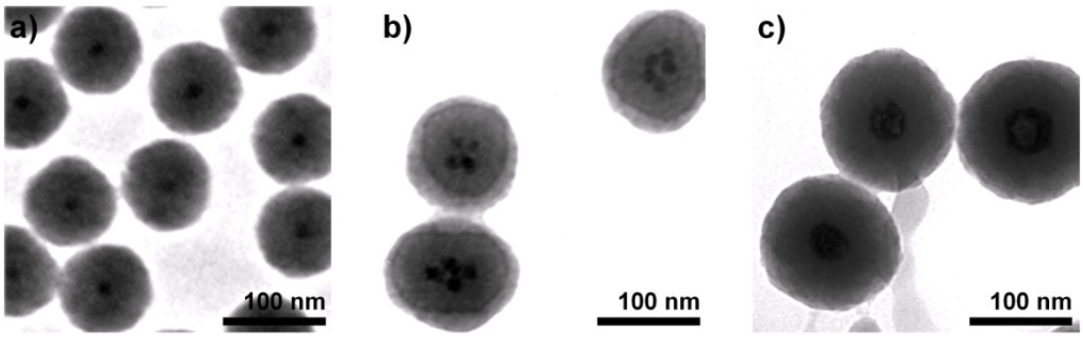

Figure SI 4. TEM images of a) *s*-MnO@SiO_2, b) *m*-MnO@SiO_2, and c) *m*-CdSe/ZnSe@SiO_2.

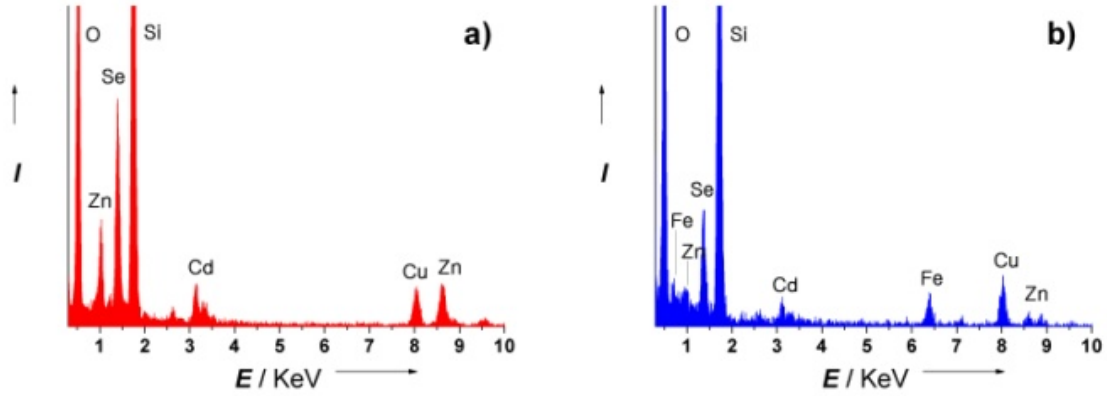

Figure SI 5. EDS spectra of a) m-CdSe/ZnSe@SiO_2 and b) m-[Fe_3O_4-CdSe/ZnSe]@SiO_2.

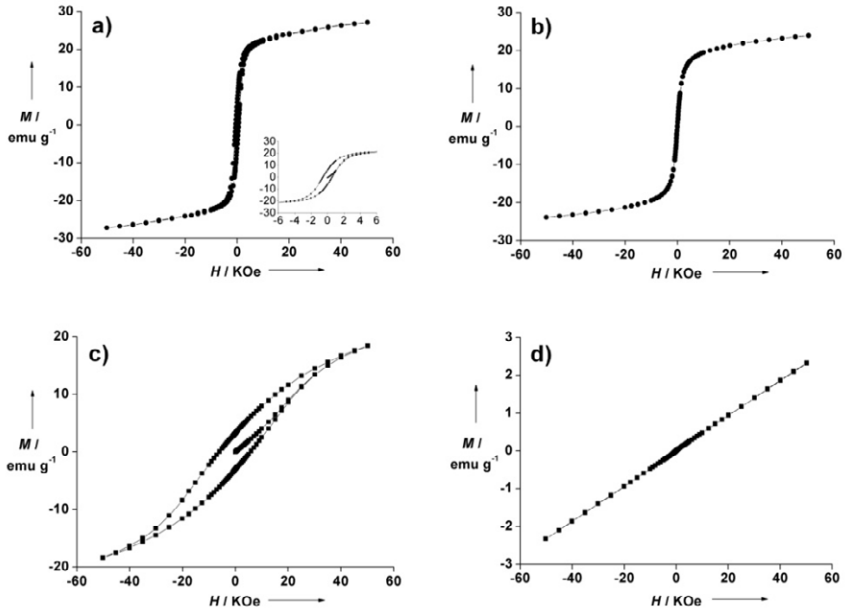

Figure SI 6. Field-dependent magnetization at a, c) 5 K and b, d) 300 K for a, b) Fe_3O_4 nanoparticles and c, d) MnO nanoparticles. Inset of a) shows the coercivity of Fe_3O_4 nanoparticles.

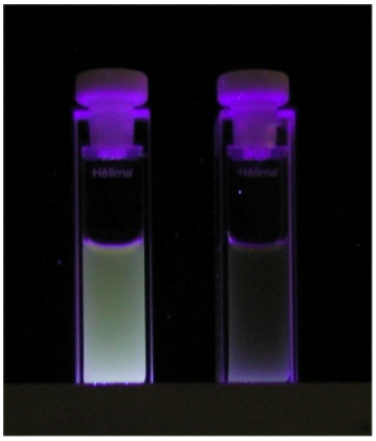

Figure SI 7. Photographs of *m*-CdSe/CdSe@SiO_2 (left) and *m*-[Fe_3O_4-CdSe/ZnSe]@SiO_2 (right) with Fe_3O_4:CdSe/ZnSe = 1:4 under UV light.

Table SI 1. The averaged size of NPs/PVP in Figure 2a-c measured by light scattering method

Sample	NPs/PVP_{29K}	NPs/PVP_{55K}	NPs/PVP_{360K}
Intensity-based calculation	93.7 ± 23.6	167.4 ± 61.6	417.0 ± 107.3
Number-based calculation	66.8 ± 14.3	97.9 ± 22.4	293.1 ± 63.9

Table SI 2.Weight fractions of the magnetic Fe_3O_4 cores in *s*-Fe_3O_4@SiO_2 and *m*-Fe_3O_4@SiO_2 measured by ICP-AES.

Concentration of *s*-Fe_3O_4@SiO_2 ($\mu g \cdot mL^{-1}$)	Concentration of Fe (ppm)	Concentration of Fe ($\mu g \cdot mL^{-1}$)	Amount of total solution (mL)	Weight of total Fe (mg)	Weight of total Fe_3O_4 (mg)	weight fraction of Fe_3O_4 in *s*-Fe_3O_4@SiO_2 (%)
2.13	25.6	25.6	10.0	0.256	0.354	1.66
Concentration of *m*-Fe_3O_4@SiO_2 ($\mu g \cdot mL^{-1}$)	Concentration of Fe (ppm)	Concentration of Fe ($\mu g \cdot mL^{-1}$)	Amount of total solution (mL)	Weight of total Fe (mg)	Weight of total Fe_3O_4 (mg)	weight fraction of Fe_3O_4 in *m*-Fe_3O_4@SiO_2 (%)
1.42	45.2	45.2	10.0	0.452	0.625	4.40