Supporting Information

Covalent Dispersion of Surfactant-Encapsulated Polyoxometalates and In-situ Incorporation of Metal Nanoparticles in Silica Spheres

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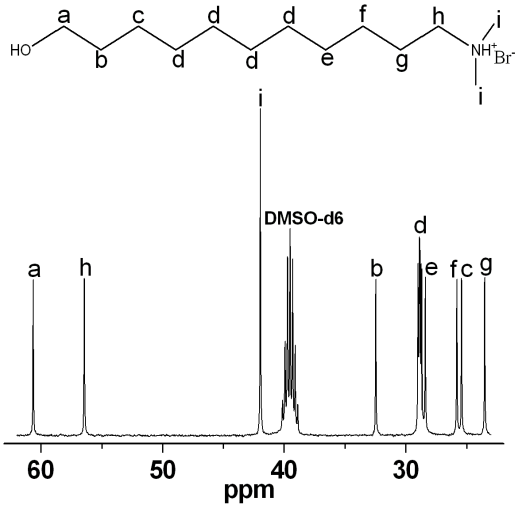

Figure S1. ^{13}C NMR spectrum of HUDAH·Br.

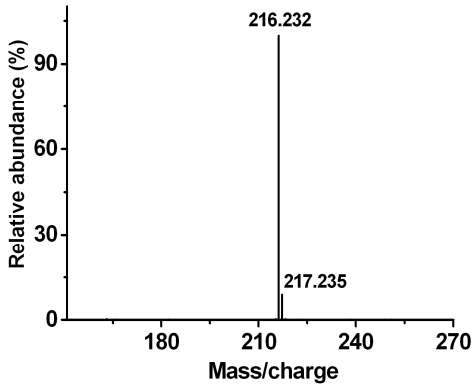

Figure S2. ESI-MS spectrum of HUDAH·Br. The marked molecular mass is assigned to the weight of $C_{13}H_{30}N_1O_1$(HUDAH$^+$).

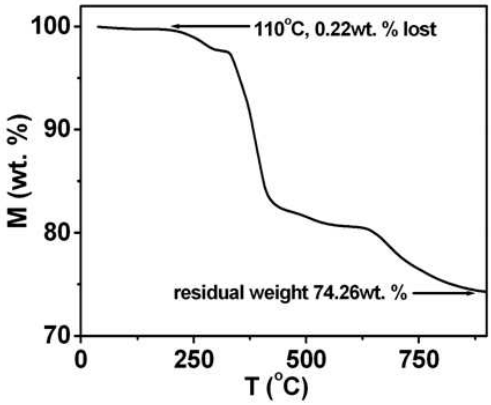

Figure S3. TGA curve of SEP-1.

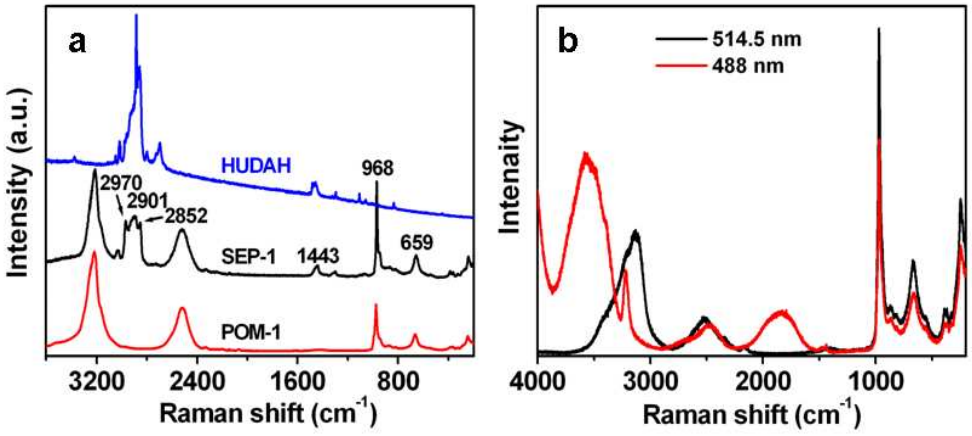

Figure S4. (a) Raman spectra of POM-1 (red), SEP-1 (black) and HUDAH (blue), excitated with 514.5-nm laser; (b) Raman spectra of SEP-1, excitated with 514.5-nm laser (black) and with 488-nm laser (red).

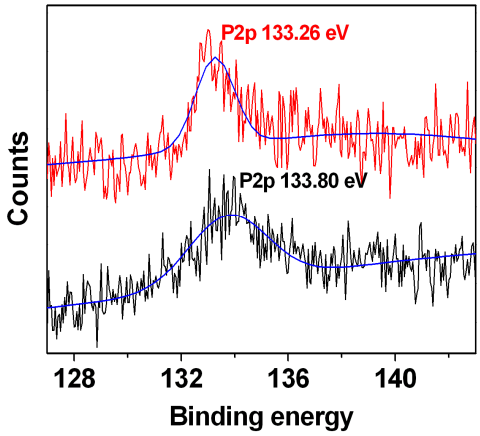

Figure S5. XPS spectra for P (2p) of pure POM-1 (red), and SEP-1/SiO_2 sphere (black).

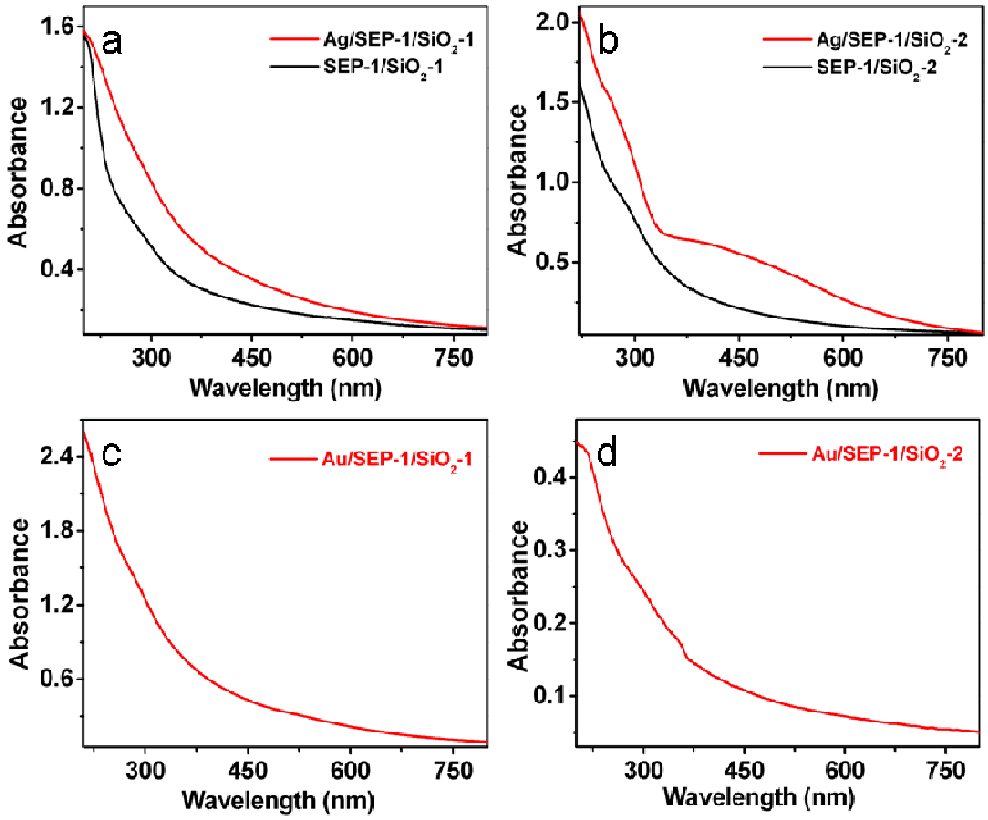

Figure S6. UV-vis spectra of (a) SEP-1/SiO_2-1 solutions with and without Ag nanoparticles, (b) SEP-1/SiO_2-2 solutions with and without Ag nanoparticles, (c) SEP-1/SiO_2-1 and (d) SEP-1/SiO_2-2 solutions with Au nanoparticles.

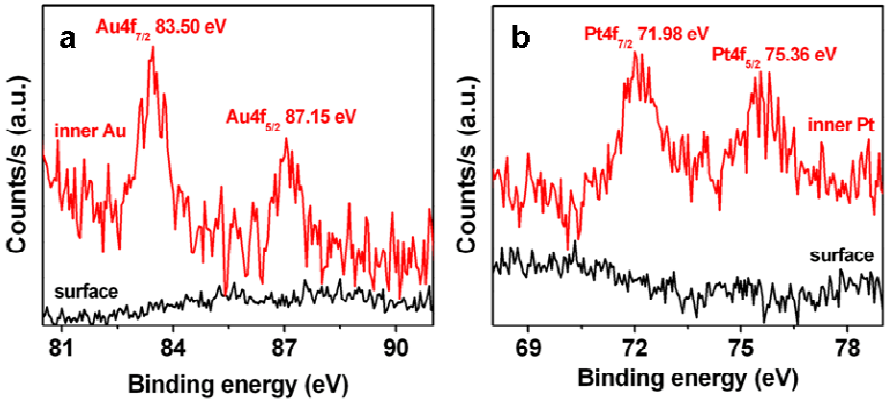

Figure S7. XPS spectra for (a) Au 4f on the surface (black) and in inner (red) of Au/SEP-1/SiO_2-2 spheres, and (b) Pt 4f on the surface (black) and in inner (red) of Pt/SEP-1/SiO_2-2 spheres.

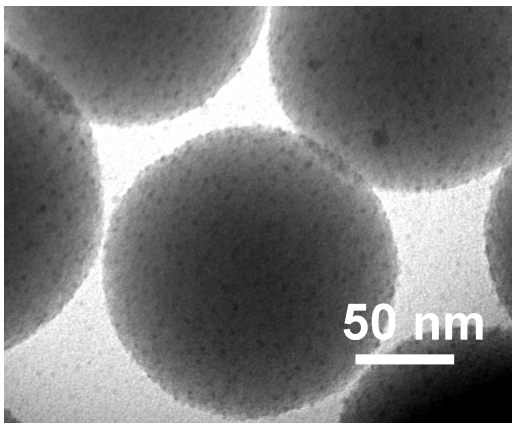

Figure S8. TEM image of SEP-1/SiO_2-1, which undergoes primarily soaking in $AgNO_3$ solution and subsequent irradiation of UV light.

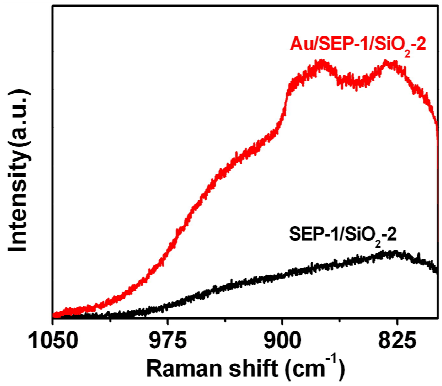

Figure S9. Raman spectra of SEP-1/SiO_2-2 with (red) and without (black) Au nanoparticles, excitated with 785-nm laser.