

Supplementary Information

Magnetic Ni/SiO₂ composite microcapsules prepared by “one-pot” synthesis

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Thermal decomposition behavior of Ni(acac)₂·2H₂O. Thermogravimetric analysis (TGA) was carried out on Ni(acac)₂·2H₂O in nitrogen atmosphere with a Perkin-Elmer thermogravimetric analyzer to reveal the thermal decomposition behavior of Ni(acac)₂·2H₂O. The temperature range was set to 25~250 °C; the temperature increasing velocity was of 5 °C/min. The TGA results are shown in Figure S1.

Control experiment of Sample 1. A control experiment was carried out by replacing Ni(acac)₂·2H₂O with equal mole of Fe(acac)₃ and equivalent amount water in Ni(acac)₂·2H₂O. In detail, 0.483 g of Fe(acac)₃ (1.37 mmol) and 0.049 mL (2.74 mmol) H₂O was dissolved in 20 mL 2-pyrrolidone. After the reaction temperature was slowly elevated to 60 °C, 243 μL of APS (1.37 mmol) and 155 μL of TEOS (0.68 mmol) was injected into the reaction solution. With the increase of reaction temperature, the viscosity of the reaction system remained nearly unchanged. The final reaction was finished at 200 °C after 5 h. A typical TEM image of the resultant sample is shown in Figure S2. The black particles were identified as magnetite nanocrystals. The cloudy substances around the particles should be silica which does not form any solid or hollow particles.

Pore-size analysis on Sample 1. N₂ adsorption/desorption isotherm was recorded on a surface area and porosity analyzer (Micromeritics ASAP 2020). The pore-size analysis shown in Figure S3 suggests that no small pores existing on the shell of the Ni/SiO₂ composite capsules.

SEM investigations on Samples 4-6. Scanning electron microscopy was used to further characterized Samples 4-6. The typical images are shown in Figure S4. Similar to what observed under TEM shown in Figure 7. Sample 4 is rigid hollow capsules, Sample 5 are collapsed capsules due to the thinner shell, and Sample 6 are spherical particles.

Crystalline phase analysis on Samples 4-6. Figure S5 presents the XRD patterns of Samples 4-6.

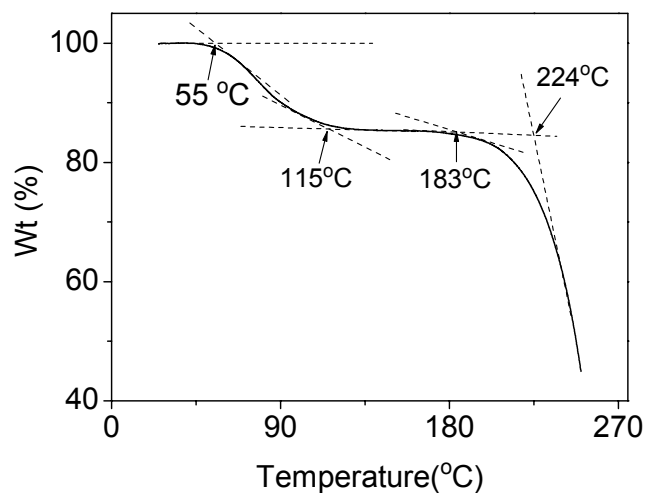


Figure S1. TGA curve of $\text{Ni}(\text{acac})_2 \cdot 2\text{H}_2\text{O}$ recorded in nitrogen.

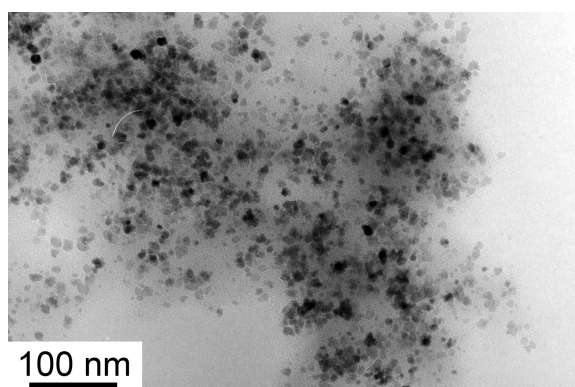


Figure S2. Magnetite nanocrystals formed by replacing $\text{Ni}(\text{acac})_2 \cdot 2\text{H}_2\text{O}$ with $\text{Fe}(\text{acac})_3$ and equivalent amount of water in the same reaction system which produces Ni/SiO_2 microcapsules.

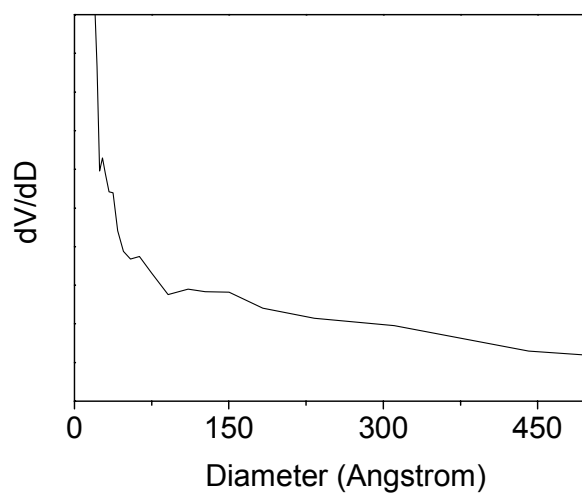


Figure S3 Pore-size distribution curve derived from the N_2 adsorption-desorption isotherm of Sample 1.

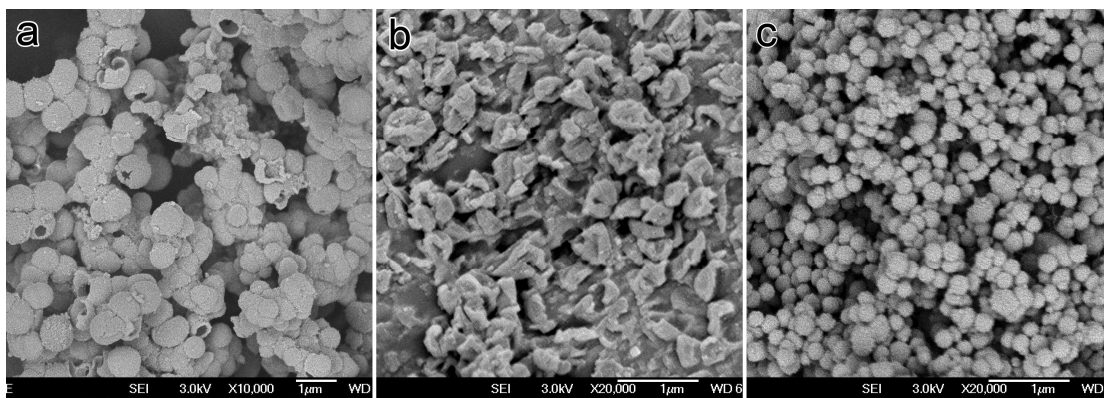


Figure S4. SEM images of sample 4 (a), sample 5 (b), sample 6 (c)

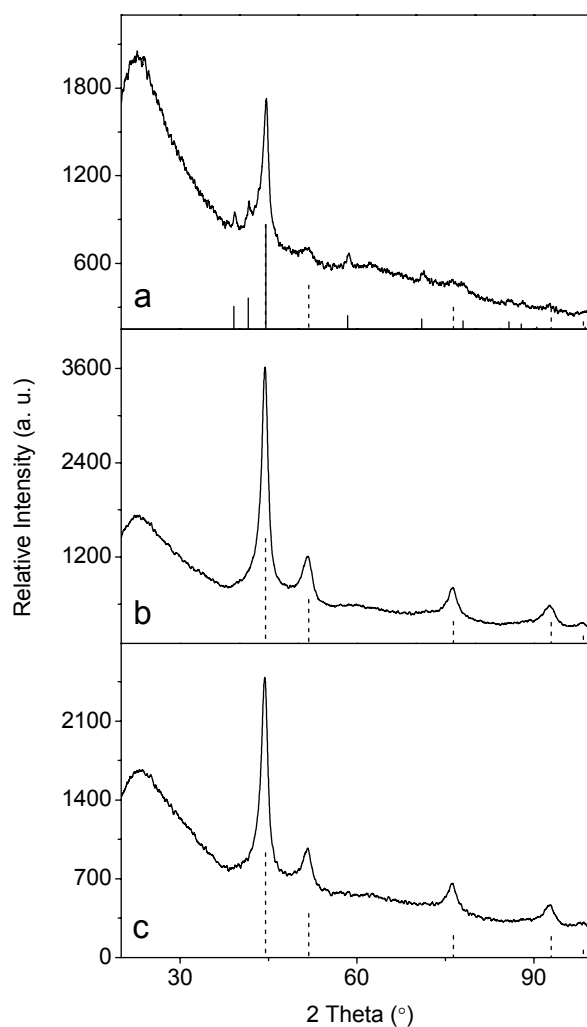


Figure S5. XRD patterns of Sample 4 (a), Sample 5 (b), and Sample 6 (c). The line patterns shown at the bottom of each frame are standard data from JCPDS cards with dashed and solid lines being correspondent to cubic and hexagonal Ni, respectively.