Electronic Supplementary Information

Controlled Synthesis of Au-Fe and Their Conversion to Au-Fe_3O_4 Heterostructured Nanoparticles

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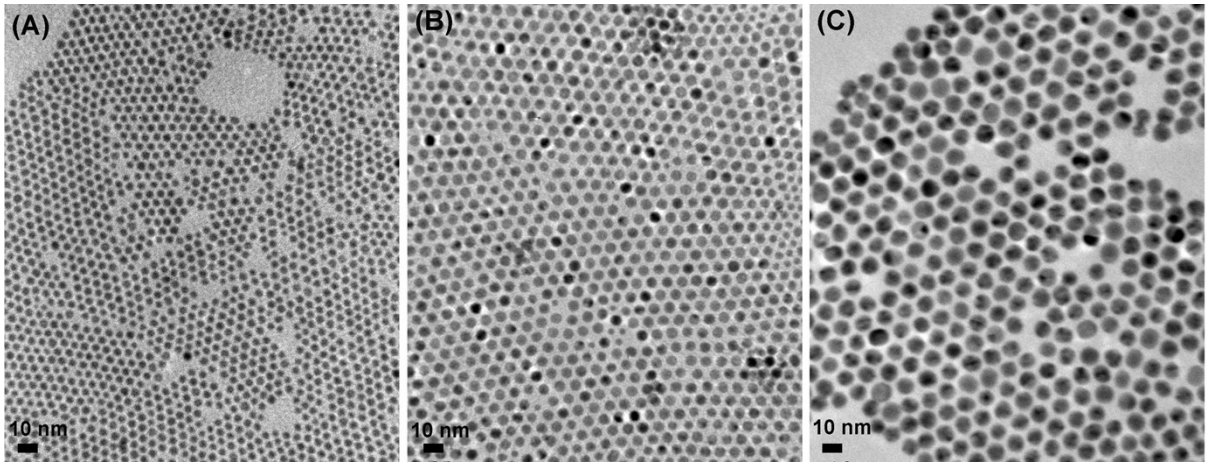

Figure S1. TEM images of 4 nm, 7 nm and 10 nm Au NPs.

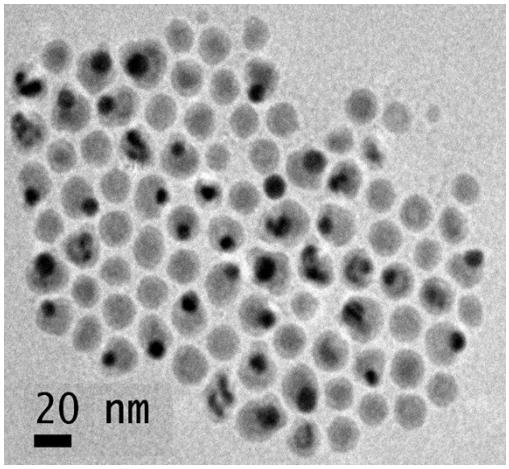

Figure S2. TEM image of the Au-Fe heterodimer NPs synthesized in the absence of HDA·HCl.

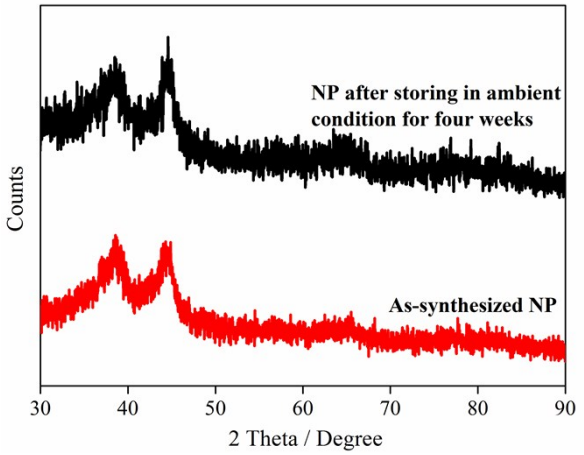

Figure S3. XRD patterns of the 4-15 nm Au-Fe heterodimer before and after the storing in ambient condition for four weeks.

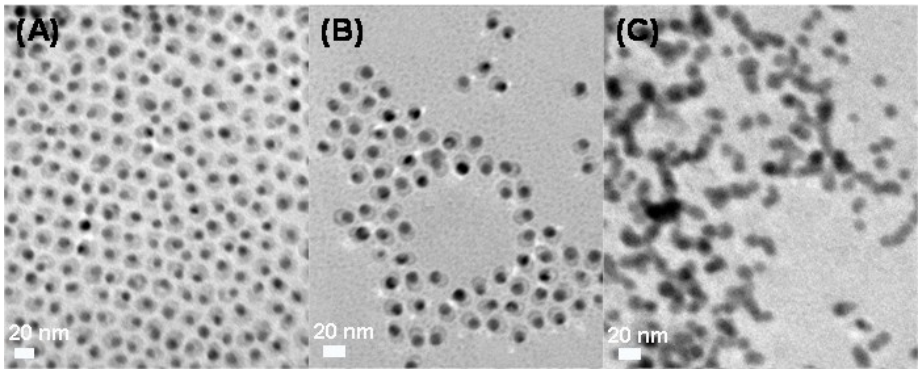

Figure S4. TEM images of the 10 nm Au-hollow Fe_3O_4 heterodimer NPs synthesized from the oxidation of 10-11 nm Au-Fe heterodimer NPs at (A) 120 ^oC; (B) 200 ^oC and (C) 240 ^oC for 15 min.

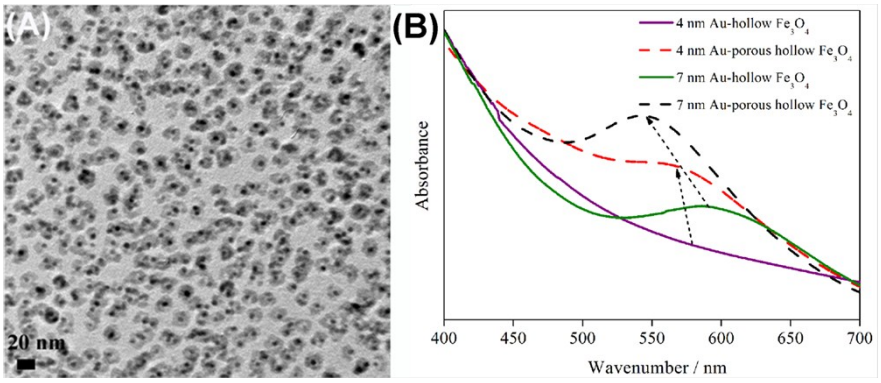

Figure S5. (A) TEM image of the 4 nm Au-porous hollow Fe_3O_4 NPs; (B) UV-Vis spectra change of the 4 nm Au-hollow Fe_3O_4 and 7 nm Au- hollow Fe_3O_4 before and after the aging.

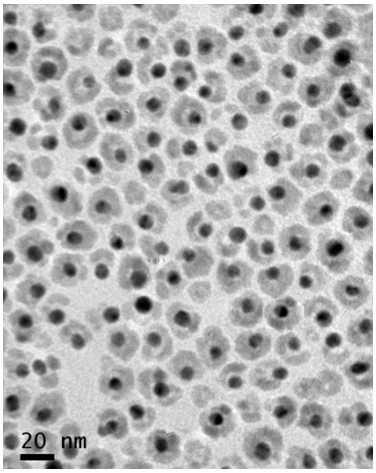

Figure S6. TEM image of the 7 nm Au-porous hollow Fe_3O_4 NPs.

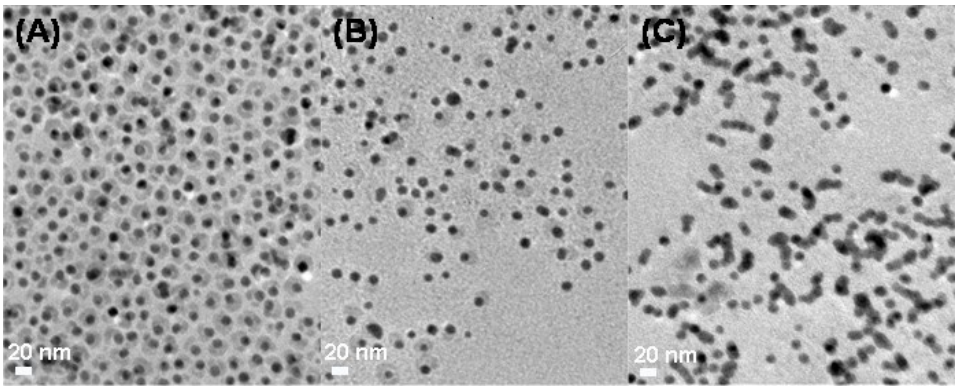

Figure S7. TEM images of the 7 nm Au-hollow porous Fe_3O_4 NPs synthesized from the 7 nm Au-hollow Fe_3O_4 heterodimer NPs after incubation for 30 min under (D) 200 ^oC, 0.08 mL OAm and 0.08 mL OAc; (E) 240 ^oC, 0.24 mL OAm and 0.08 mL OAc; (F) 240 ^oC, 0.08 mL OAm and 0.24 mL OAc.

Table S1. Reaction conditions for the synthesis of the Au-Fe heterodimer NPs, Au-hollow Fe_3O_4 yolk-shell NPs and the Au-porous hollow Fe_3O_4 NPs.

Sample	Materials			Surfactant			Solvent		Temp. / °C	Time / min
	Au	$Fe(CO)_5$	Seeds	OAm / mL	Oleic acid / mL	HDA.HCl / mmol	ODE/ mL	Benzyl ether/ mL		
4 nm Au-Fe heterodimer NPs	24 mg (4 nm)	0.28 mL	/	1.0	/	1.0	12	/	180	30
7 nm Au-Fe heterodimer NPs	24 mg (7 nm)	0.24 mL	/	1.0	/	1.0	12	/	180	30
10 nm Au-Fe heterodimer NPs	30 mg (10 nm)	0.21 mL	/	1.0	/	1.0	12	/	180	30
4 nm Au-hollow Fe_3O_4 yolk/shell NPs	/	/	4 nm Au-Fe heterodimer NPs	1.0	/	/	20	/	160	15
7 nm Au-hollow Fe_3O_4 yolk/shell NPs	/	/	7 nm Au-Fe heterodimer NPs	1.0	/	/	20	/	160	15
10 nm Au-hollow Fe_3O_4 heterodimer NPs	/	/	10 nm Au-Fe heterodimer NPs	1.0	/	/	20	/	160	15
4 nm Au-hollow porous Fe_3O_4 heterodimer NPs	/	/	4 nm Au-hollow Fe_3O_4 yolk/shell NPs	0.08	0.08	/	/	10	240	30
7 nm Au-hollow porous Fe_3O_4 heterodimer NPs	/	/	7 nm Au-hollow Fe_3O_4 yolk/shell NPs	0.08	0.08	/	/	10	240	30