

Supporting Information

Core/Shell Structured Noble Metal (Alloy)/Cadmium

Selenide Nanocrystals

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Synthesis of FePt nanoparticles

FePt nanoparticles were prepared by a procedure modified from those reported previously.^{1, 2} For a typical reaction, platinum (II) acetylacetonate (100 mg), iron (III) acetylacetonate (180 mg), 1,2-hexadecandiol (260 mg) and oleylamine (10mL) were mixed in a 50 mL three-necked flask, and the mixture was heated to 120 °C under argon flow and held at 120 °C for 20 min, followed by keeping at 240 °C for 1 h and subsequently at 298 °C for 2 h **before being cooled** to RT. The resulting FePt nanoparticles were purified by washing with ethanol and subsequent centrifuging and dispersed in n-hexane.

Synthesis of NiPt nanoparticles

NiPt nanoparticles were prepared by a procedure modified from those reported previously.³ For a typical reaction, 78 mg of nickel (II) acetylacetonate, 0.2 mL of oleylamine, 0.2 mL of oleic acid and 10mL of benzyl ether were mixed in a 50 mL three-necked flask, and the mixture was heated to 120 °C and held at 120 °C for 30 min under argon flow before 390 mg of 1,2-hexadecandiol was added. The mixture was then heated to 200 °C and 40 mg of platinum (II) acetylacetonate was added. The reaction mixture was stirred for 1 h at 200 °C. **At RT**, the resulting NiPt nanoparticles were purified by washing with ethanol and subsequent centrifuging and dispersed in n-hexane.

Synthesis of CoPt nanoparticles

CoPt nanoparticles were synthesized via co-reduction of metal salts.^{1,4} The mixture of

platinum (II) acetylacetonate (50 mg), cobalt (II) acetylacetonate (65 mg), 1,2-hexadecandiol (130 mg) and OAm(5mL) was heated to 140 °C under argon flow and held at 140 °C for 20 min. After the hold, the mixture was heated to 210 °C and held at 210 °C for 40 min. **At RT**, the resulting CoPt nanoparticles were purified by washing with ethanol and subsequent centrifuging and dispersed in n-hexane.

Synthesis of Au nanoparticles

2 nm Au nanoparticles were synthesized by a procedure modified from reported methods.⁵ In the modified procedure, only tetraoctylammonium bromide was substituted by didodecyldimethylammonium bromide,⁶ the resulting Au nanoparticles were 2 nm in size. A seed-mediated growth method was used to synthesize 6 nm Au nanoparticles, with 2 nm Au nanoparticles as seeds and hydrazine hydrate as reducing agent. The as-prepared 6 nm Au nanoparticles were dispersed in toluene.

Synthesis of noble metal (alloy)/cadmium chalcogenide nanocrystals

The mixture of CdO (40 mg) and stearic acid (SA, 350 mg)⁷ was heated to 160 °C and held at 160 °C for 20 min, and **added** with 15 mL of solvent and 10 mL of n-hexane or toluene solution containing appropriate amount of noble metal (alloy) nanoparticles at RT. **Purging with Ar, the above mixture was heated to** 85-110 °C to remove n-hexane or toluene and subsequently heated to 290 - 300 °C. At this temperature, TOPSe (79 mg of Se powder in 2.5 mL of TOP) or DOAS (20 mg of S powder in 2.5 mL of dioctylamine) was injected swiftly, and products with different shell sizes could be produced by modifying reaction time. After **being cooled** to RT, the products were purified by size-selective precipitation/washing steps, finally the products were dispersed in n-hexane.

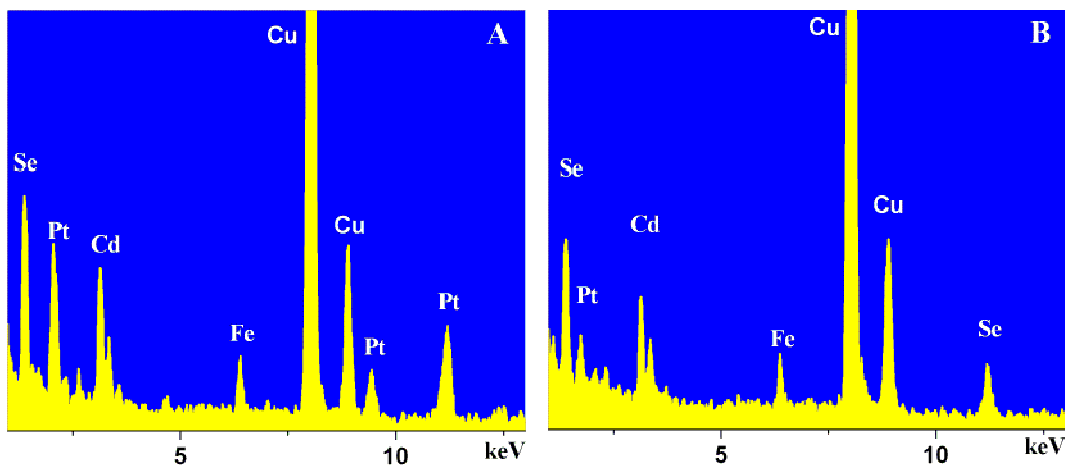


Figure S1. EDX Spectra of the as-prepared FePt/CdSe nanocrystals. (A) the core and (B) the shell.

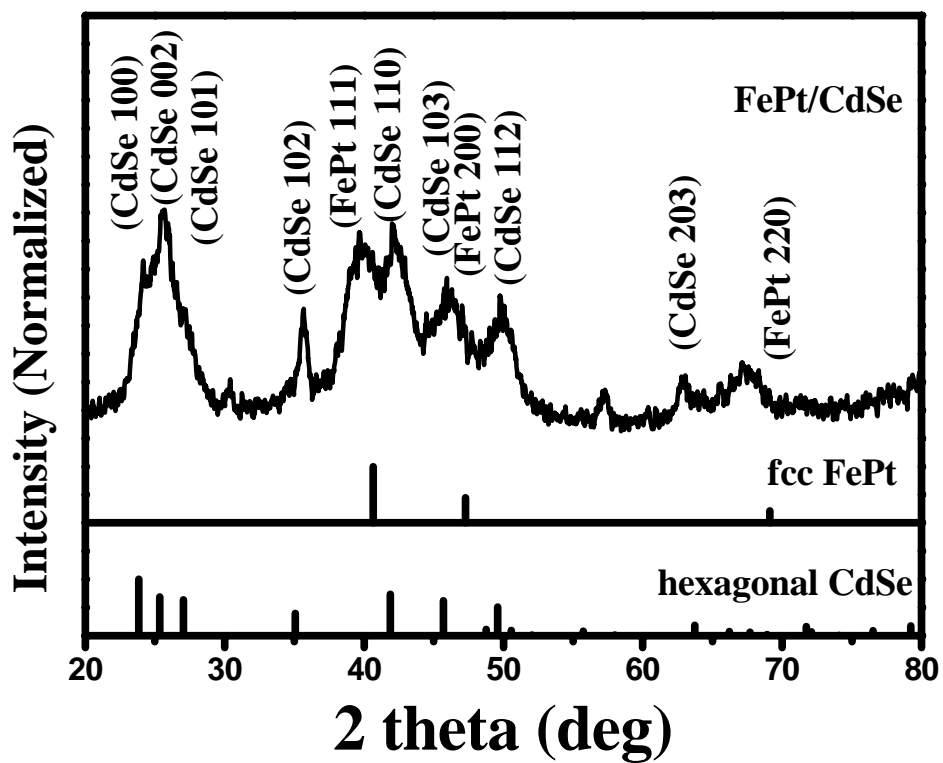


Figure S2 XRD pattern of the as-prepared FePt/CdSe nanocrystals.

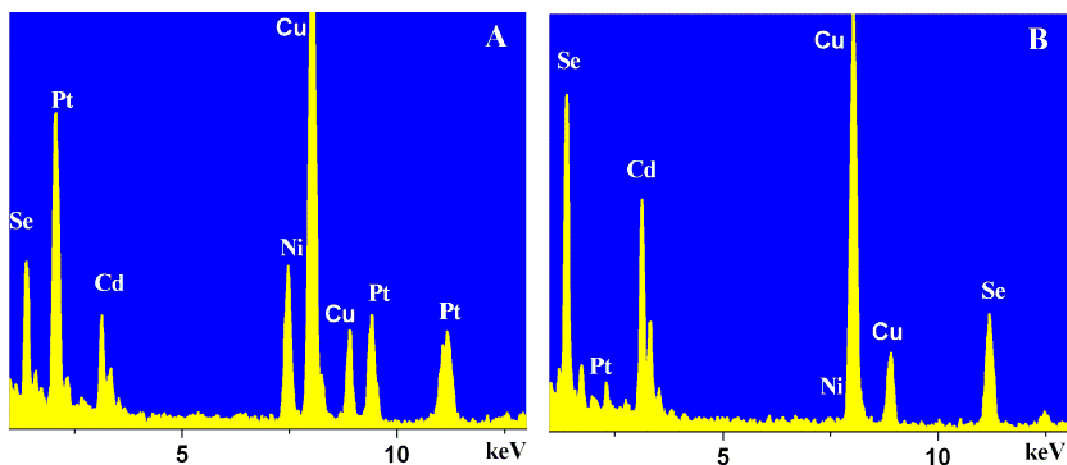


Figure S3 EDX Spectra of the as-prepared NiPt/CdSe nanocrystals. (A) the core and (B) the shell.

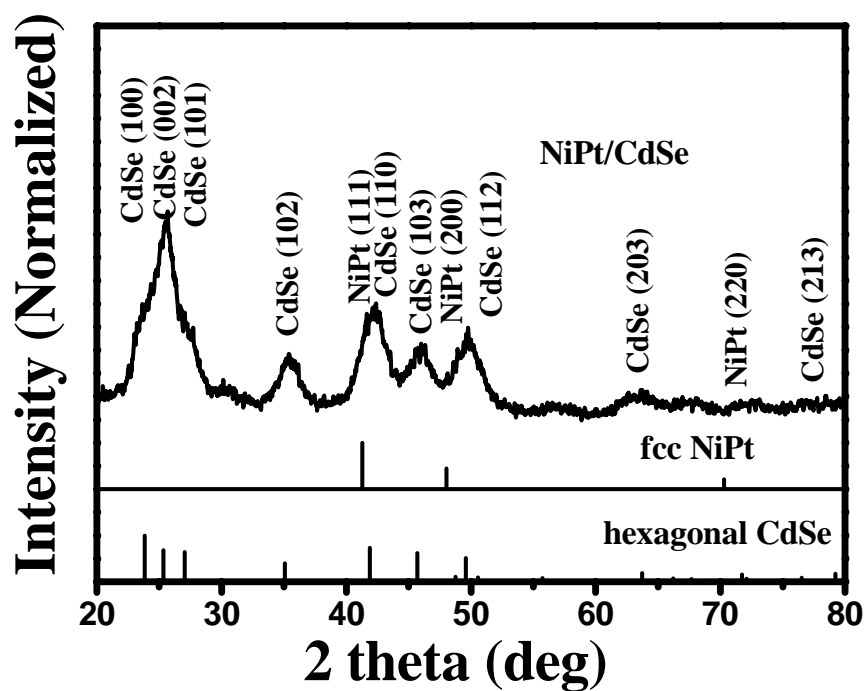


Figure S4 XRD pattern of the as-prepared NiPt/CdSe nanocrystals.

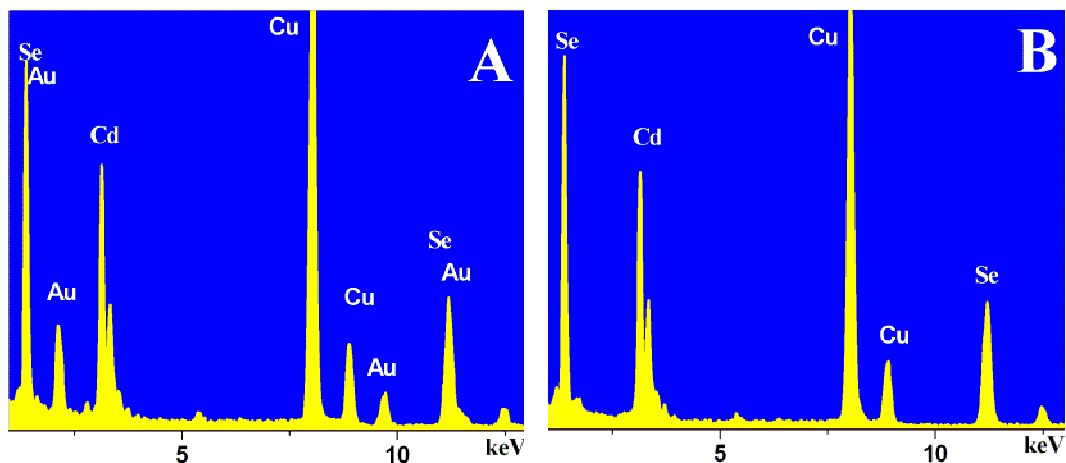


Figure S5 EDX Spectra of the as-prepared Au/CdSe nanocrystals. (A) the core and (B) the shell.

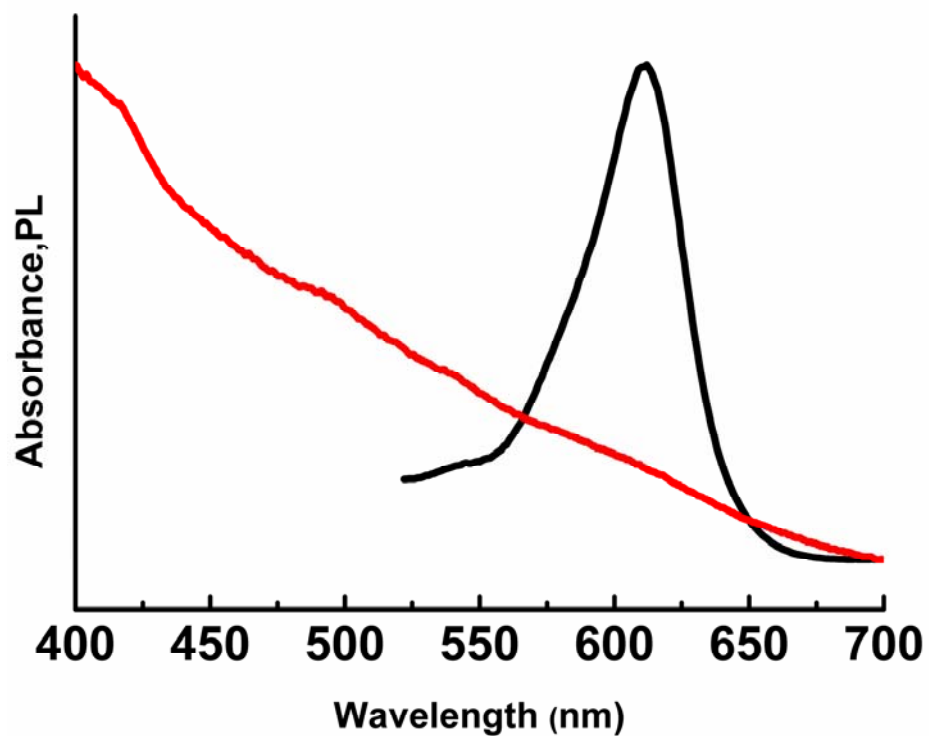


Figure S6 Absorption and emission spectra of one of the as-prepared FePt/CdSe nanocrystals samples.

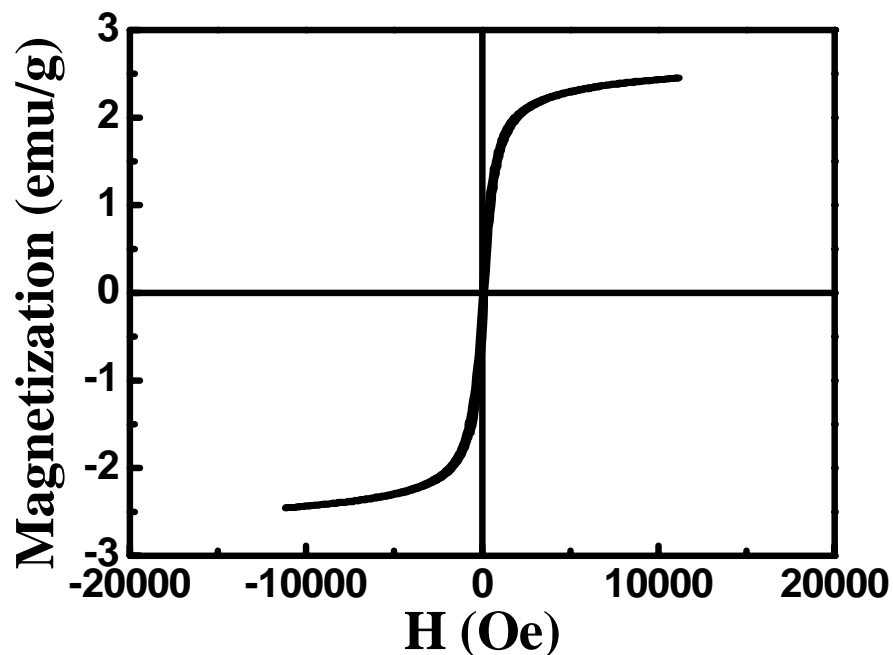


Figure S7 RT hysteresis loop of one of the as-prepared FePt/CdSe nanocrystals samples.

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