

Supplementary information for

A Versatile Ethanol-Mediated Polymerization of Dopamine for Efficient Surface Modification and Construction of Functional Core-Shell Nanostructures

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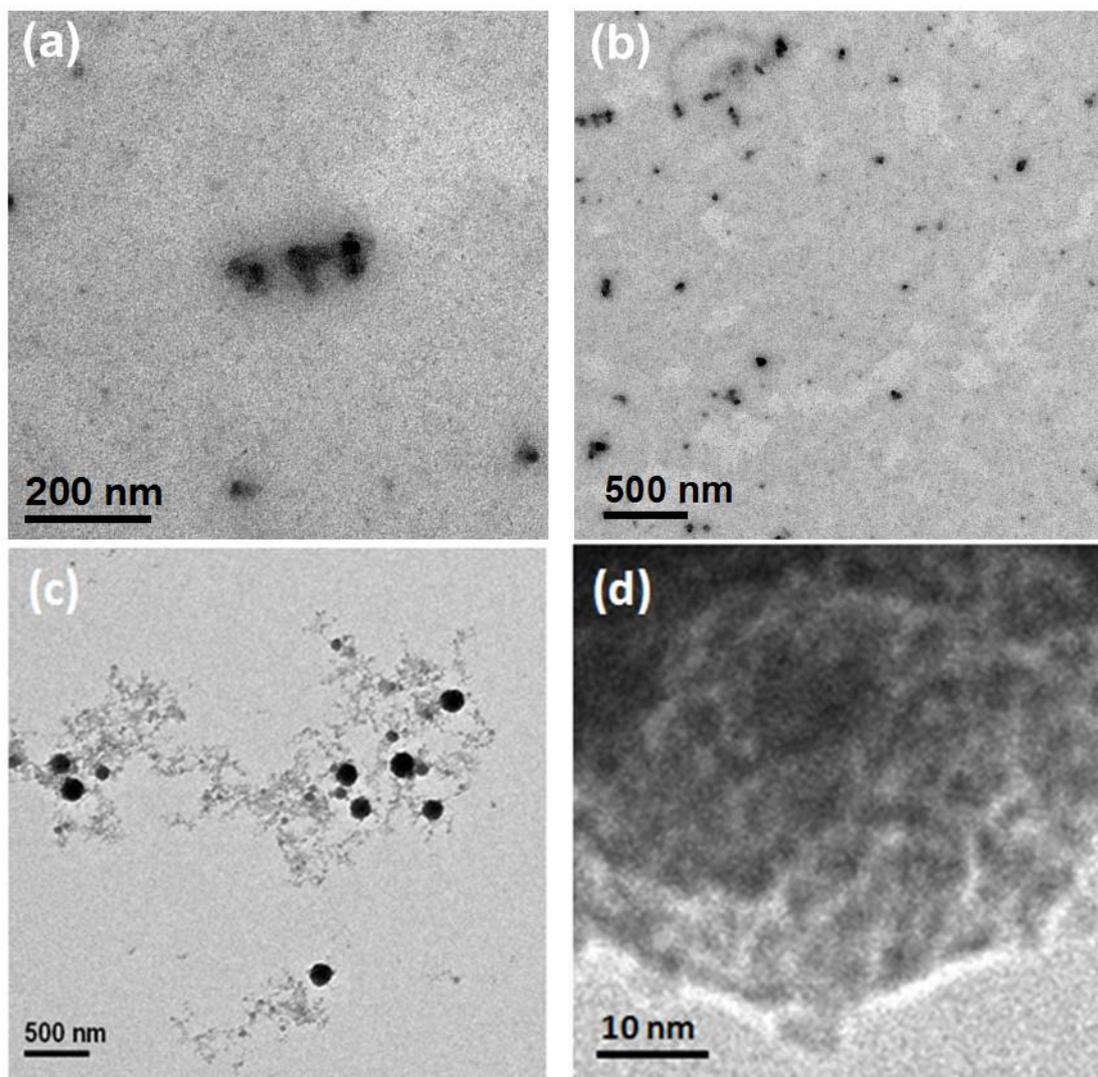


Figure S1. TEM images of the PDA samples obtained at different stages, after reaction for (a), 1 h, (b), 2 h, (c), 4 h. Panel (d) is the magnified image of (c).

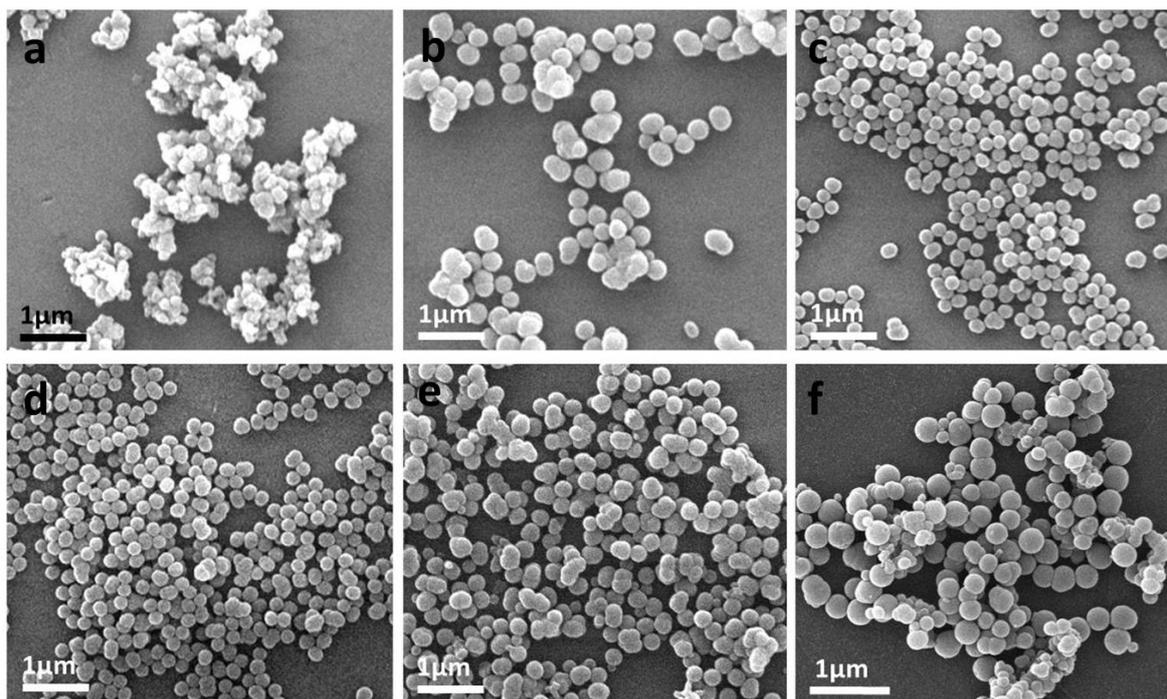


Figure S2. SEM images of PDA microspheres synthesized in ethanol/water mixture with different ethanol/water volume ratios (a) 5/40, (b) 10/35, (c) 15/30, (d) 25/20, (e) 35/10 and (f) 40/5, after reaction for 4 h. From these results, it can be seen that, uniform PDA microspheres with good dispersibility and size homogeneity can be obtained in the $R_{e/w}$ value of 1/3.5~3.5, and the microspheres obtained with lower $R_{e/w}$ ($< 1/3.5$) values show many aggregated particles. However, well-dispersed microspheres with broad size distribution were obtained in higher $R_{e/w}$ (> 3.5) values.

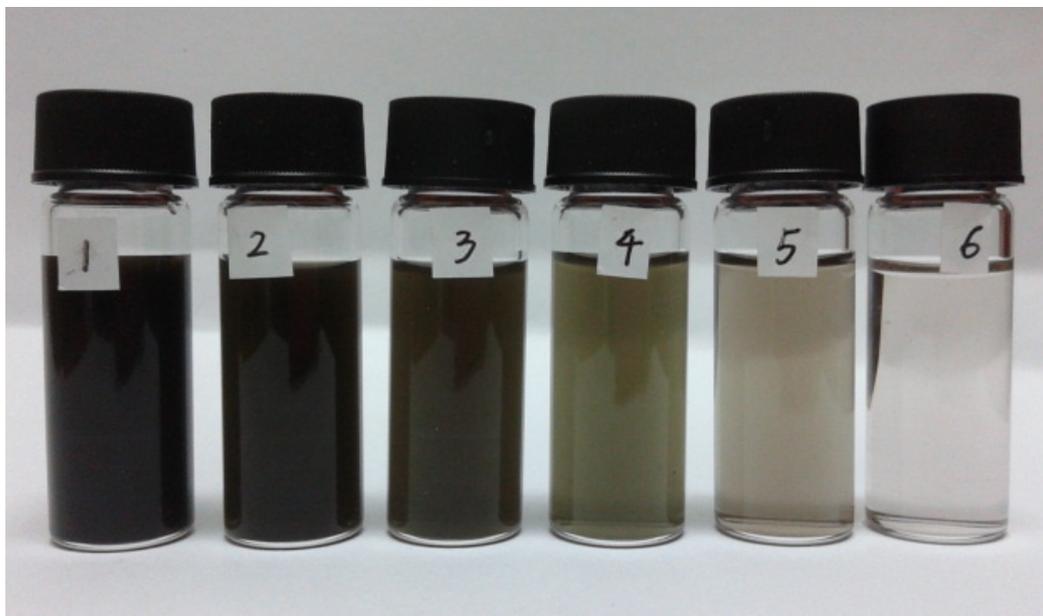


Figure S3. The photographs of the reaction solutions for the synthesis of PDA microspheres with different ethanol/water volume ratios (1) 5/40, (2) 10/35, (3) 15/30, (4) 25/20, (5) 35/10 and (6) without water, after reaction for 4 h.

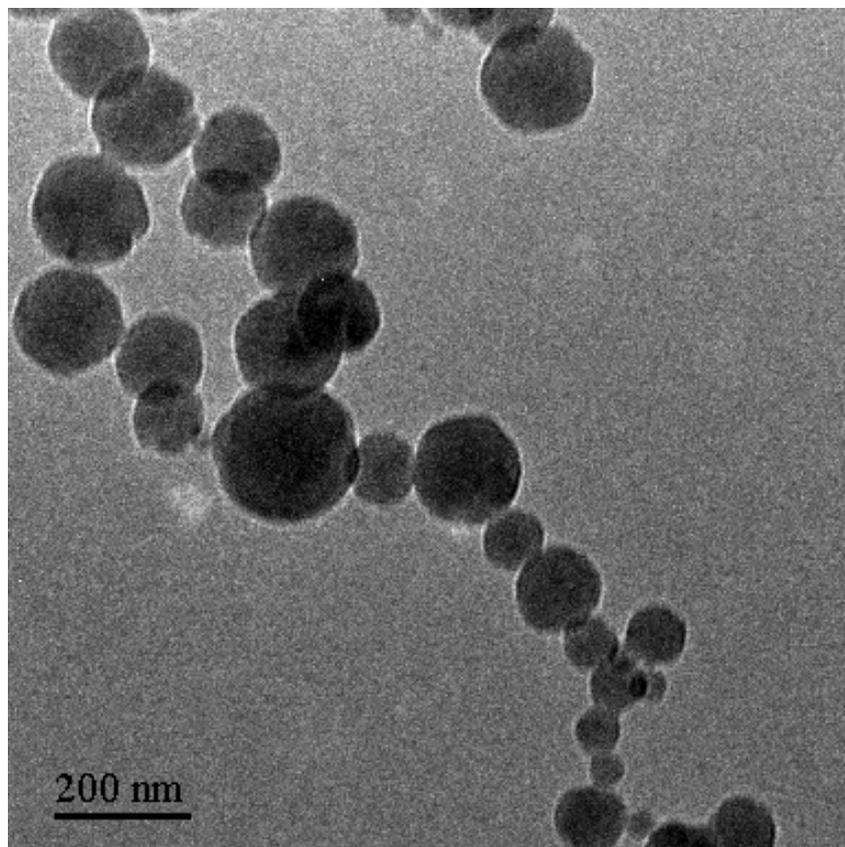


Figure S4. TEM images of the PDA spheres synthesized in the solution consisting of water (5 mL) and ethanol (40 mL) as the solvent (i.e. with a volume ratio, $R_{w/e}$, of 0.125), TRIS (0.22 mM) and dopamine (0.44 g/L).

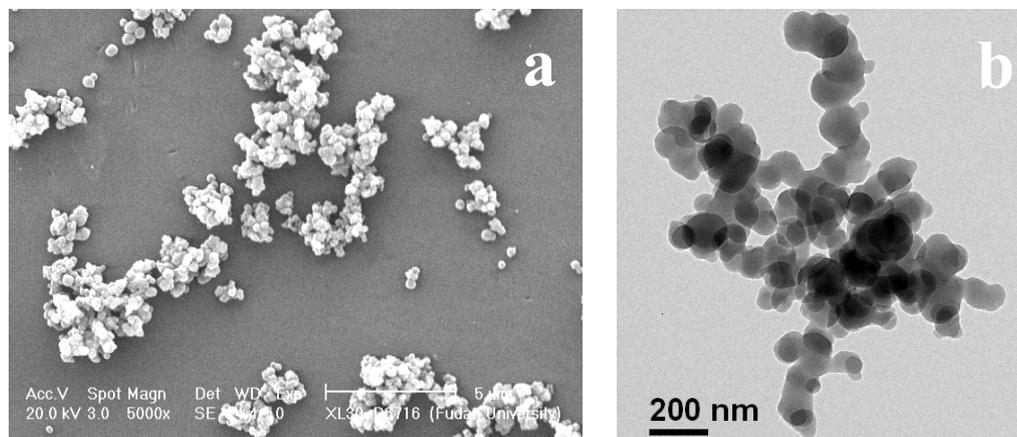


Figure S5. SEM (a) and TEM (b) images of the PDA spheres synthesized in the aqueous solution containing 40 ml of water, dopamine (0.22 g/L) and TRIS (0.67 g/L).

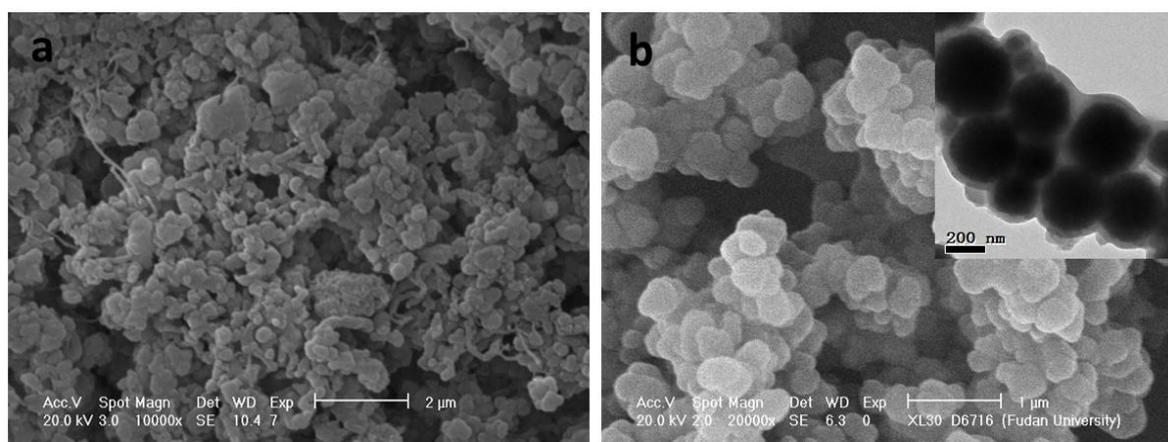


Figure S6. SEM images of (a) CNTs@PDA composite and (b) Fe₃O₄@PDA composite synthesized in 40 ml of aqueous solution water containing dopamine (0.22 g/L) and TRIS (0.67 g/L). The inset is the TEM image of Fe₃O₄@PDA composite. Both the obtained CNT@PDA and Fe₃O₄@PDA composites consist of aggregated particles with ill-defined structure and morphology.

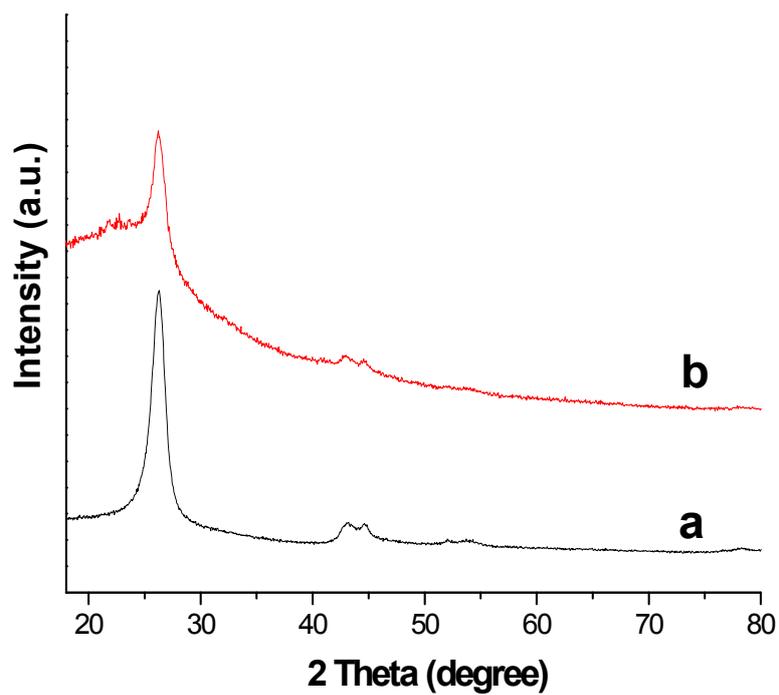


Figure S7. The wide-angle X-ray diffraction patterns of (a) the pristine CNTs and (b) PDA-coated CNTs

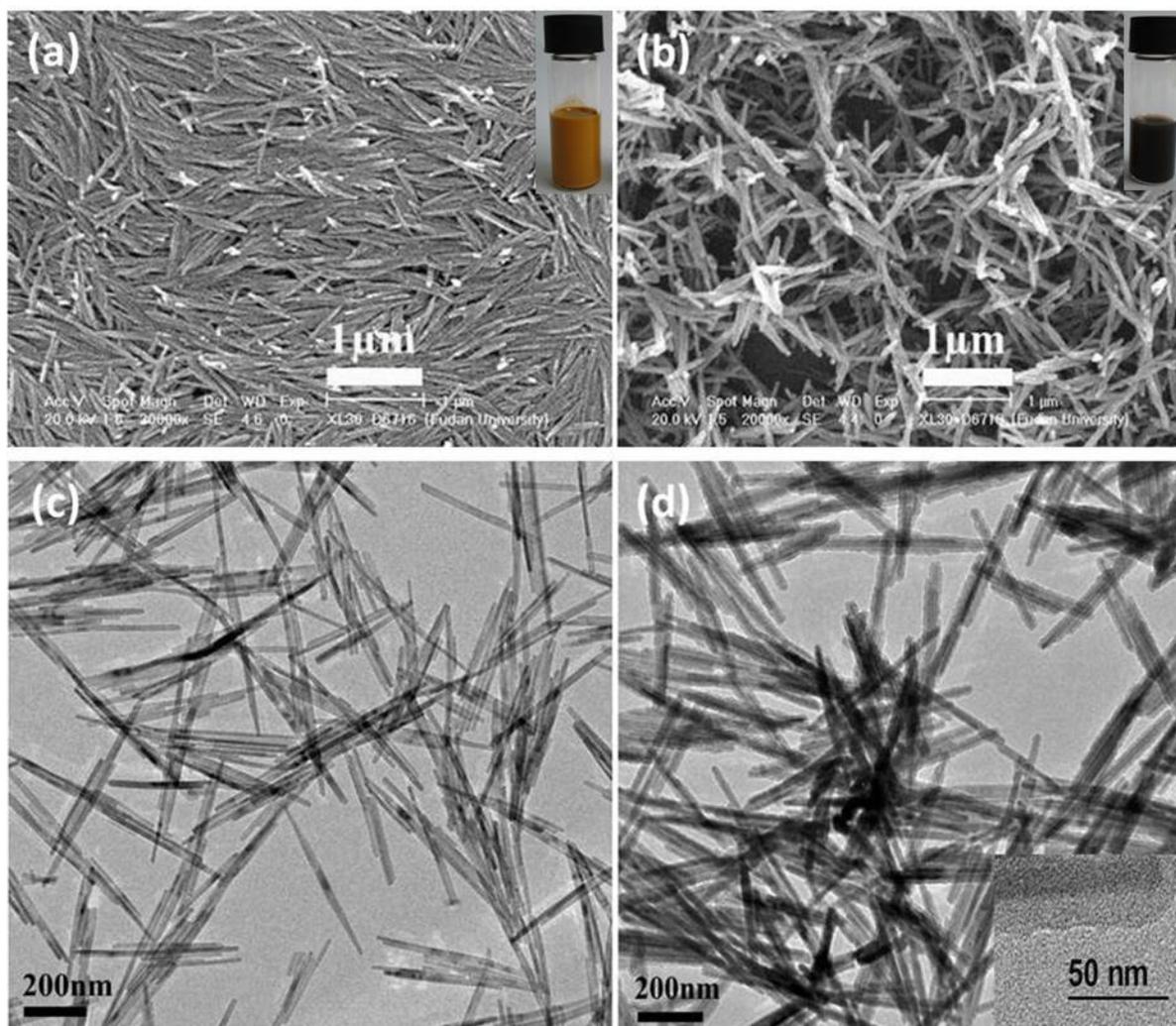


Figure S8. SEM (a, b) and TEM (c, d) images of the hydrophilic hematite nanorods before (a, c) and after (b, d) the modification with polydopamine in the water-ethanol solution using TRIS as the catalyst. The insets show the photographs of the sample solutions, indicating excellent water dispersibility.

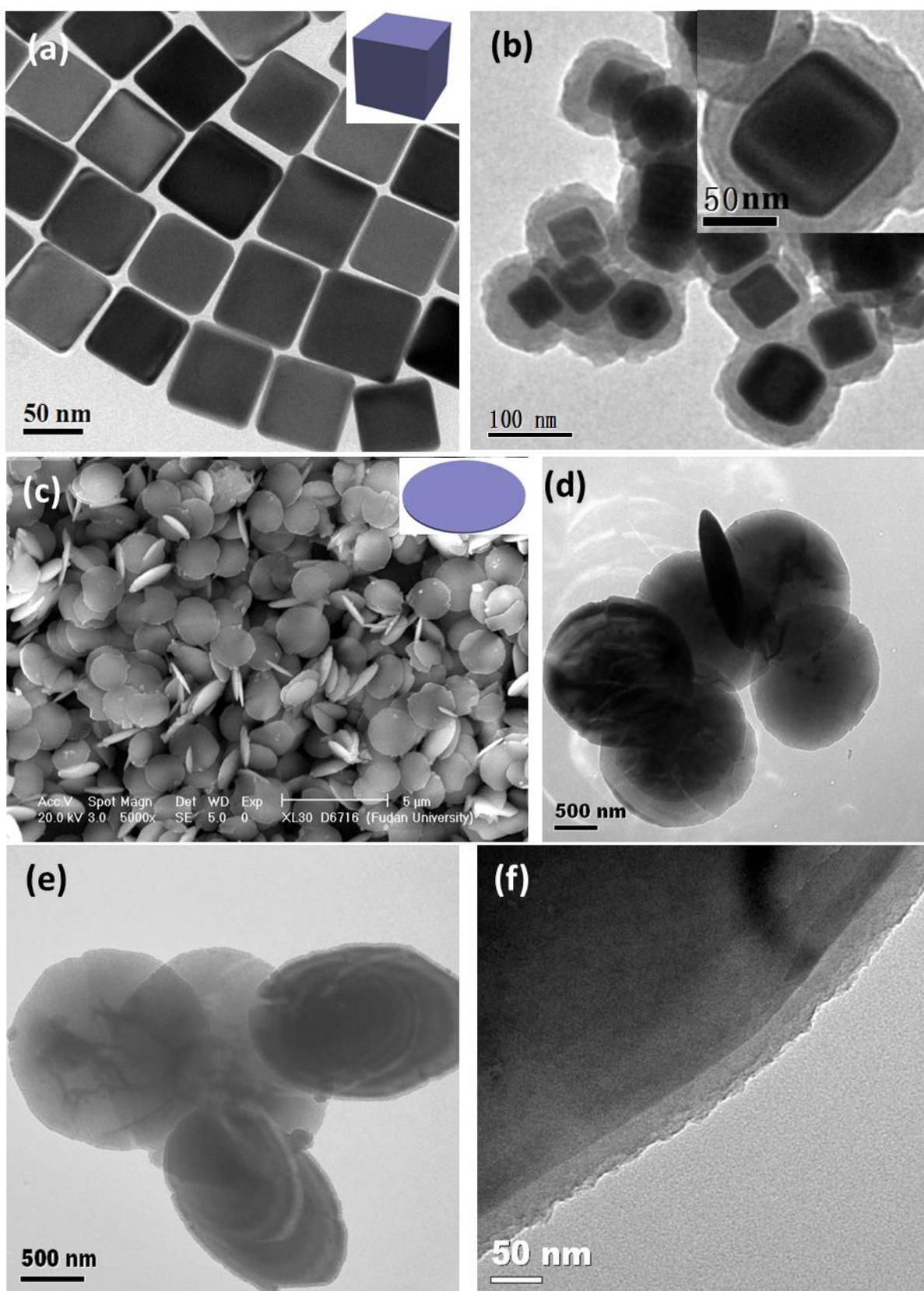


Figure S9. TEM images of the silver nanocubes (a) before and (b) after the modification by PDA in the water-ethanol solution using TRIS as the catalyst. (c) SEM and (d) TEM images of the upconversion phosphor nanodiscs (UCNP) and TEM images (e, f) of PDA-coated UCNP after modification by polydopamine.