Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supporting Information

Title: Highly efficient and selective extraction of uranium from aqueous solution by a magnetic device based on succinyl-β-cyclodextrin-APTES@maghemite nanoparticles

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Results

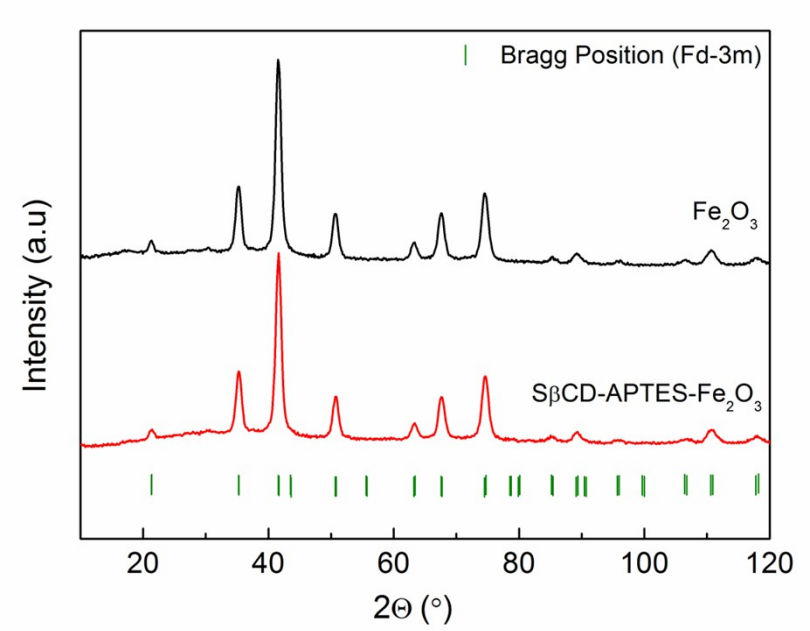

Figure S1: XRD pattern of Fe_2O_3 nanoparticles before and after surface functionalization with SβCD: (a) Fe_2O_3; (b) SβCD-APTES@Fe_2O_3.

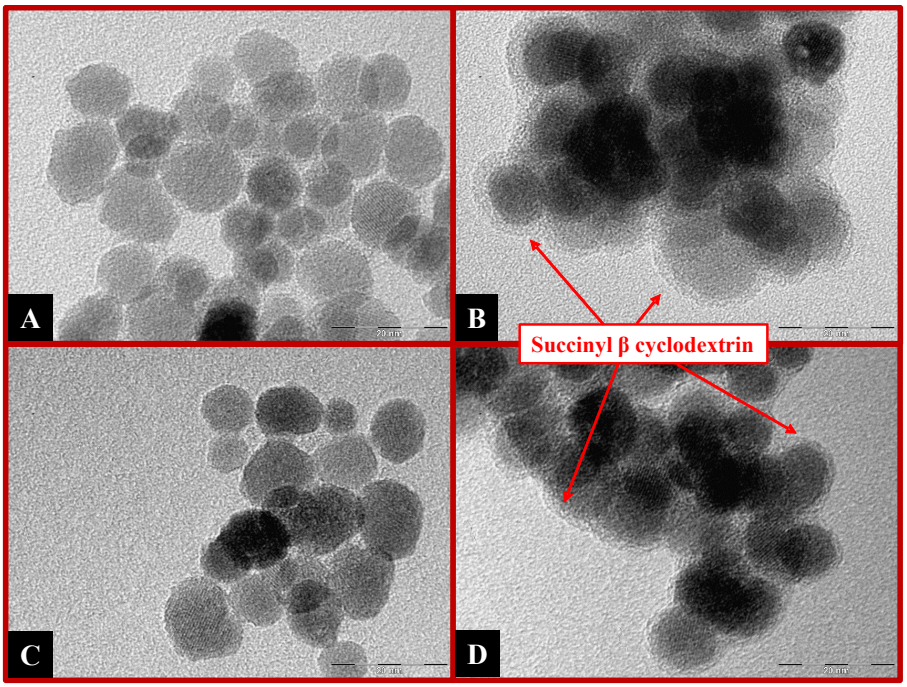

Figure S2: TEM images of APTES@Fe_2O_3 nanoparticles before and after surface functionalization with SβCD: (a), (c) APTES@Fe_2O_3; (b), (d) SβCD-APTES@Fe_2O_3.

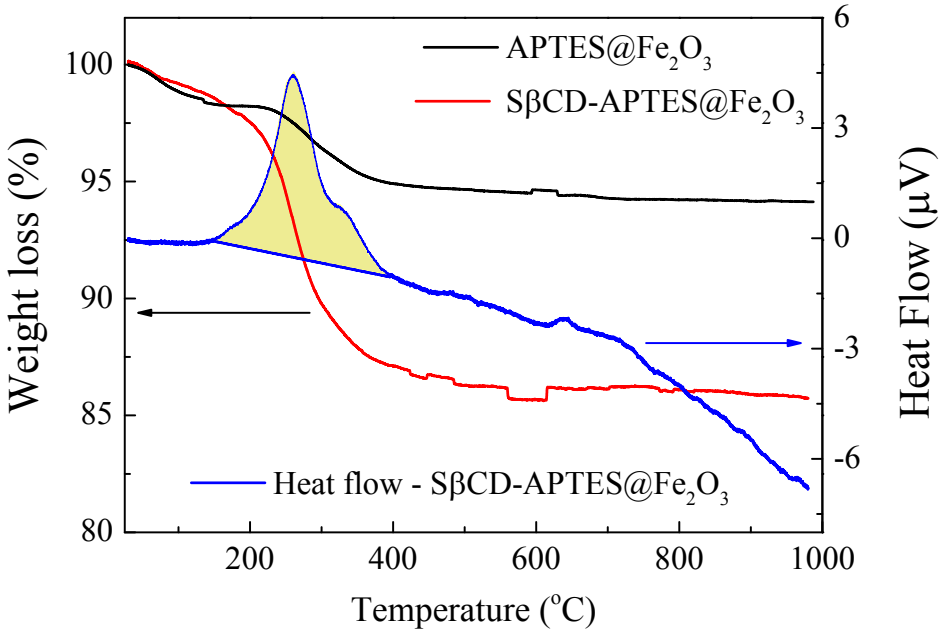

Figure S3: Thermogravimetric analysis of SβCD-APTES@Fe_2O_3 (red line) and APTES@Fe_2O_3 (black line).

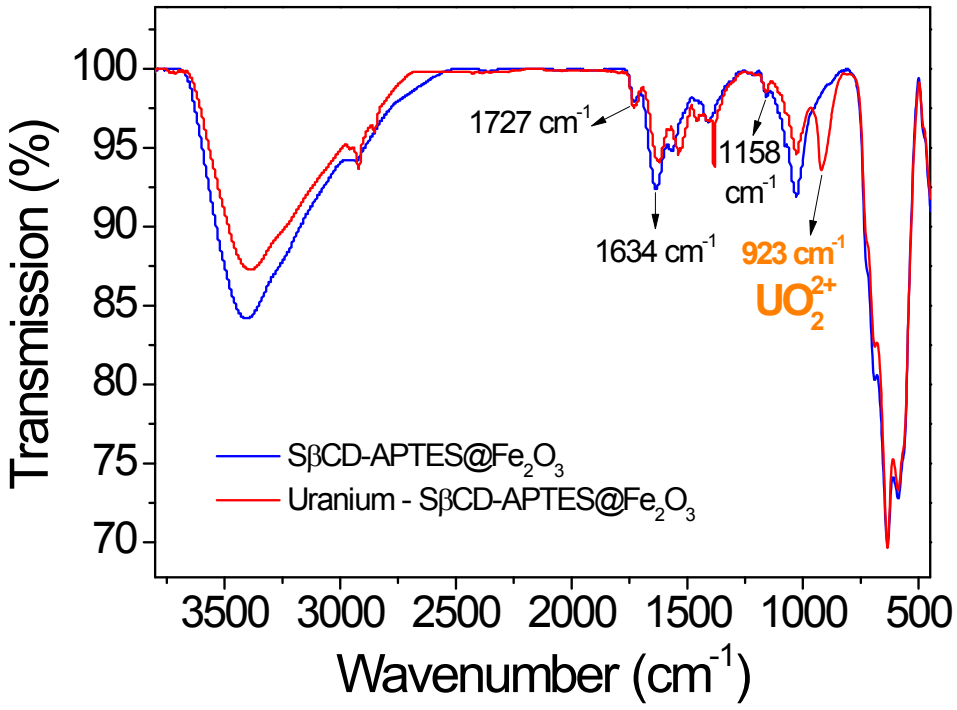

Figure S4: FTIR spectra of SβCD-APTES@Fe_2O_3: (blue) before U(VI) adsorption; (red) after U(VI) adsorption. Initial U(VI) concentration, 100 mg L^{-1}; adsorbent dose, 0.005 g; pH 6; 25 °C.

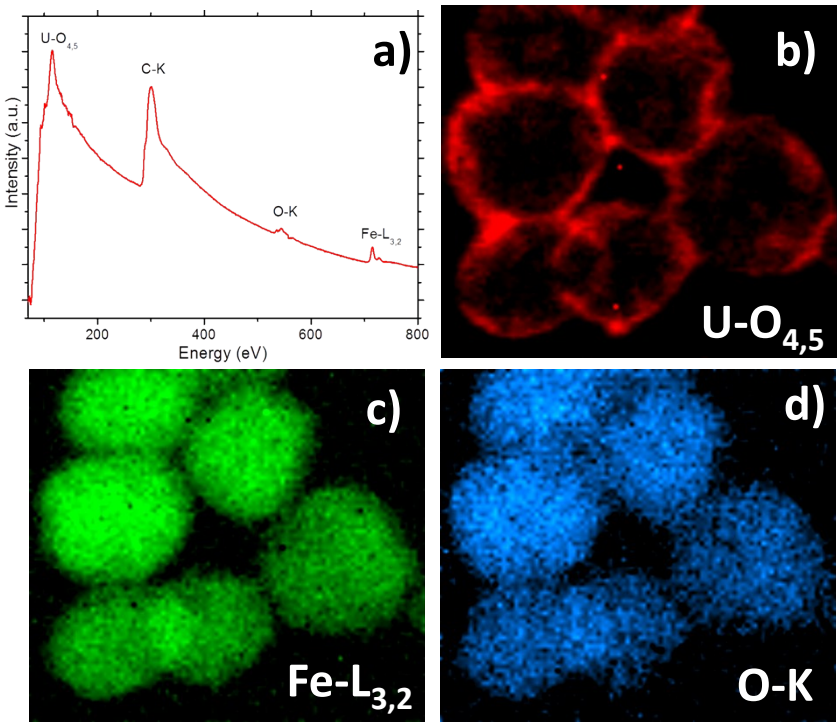

Figure S5: EELS extracted spectrum profile of U(VI)-loaded SβCD-APTES@Fe_2O_3 NPs. The spectrum image was recorded over the entire area with a resolution of 96 x 86 pixels, which results in a pixel size of 0.31 nm. The channel size for this experiment was set to 0.5 eV and the pixel time used was 0.1 s.

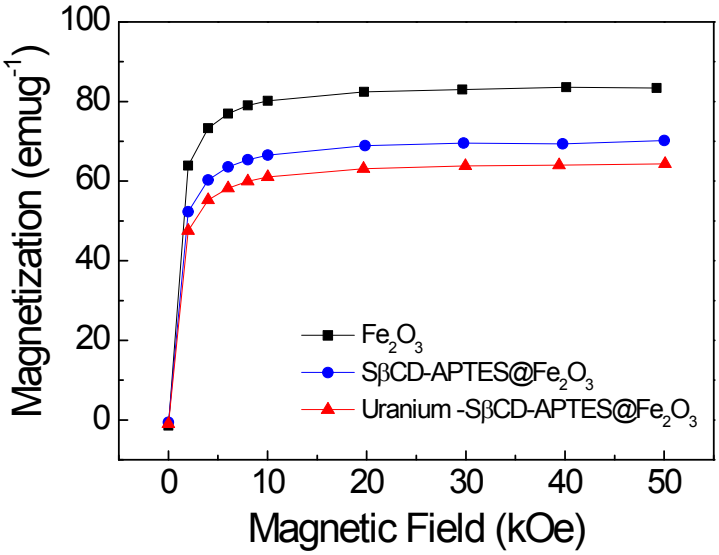

Figure S6: First emanation curves measured at 5 K, of raw NPs (black), and SβCD-functionalized NPs before (blue) and after complexation (red).

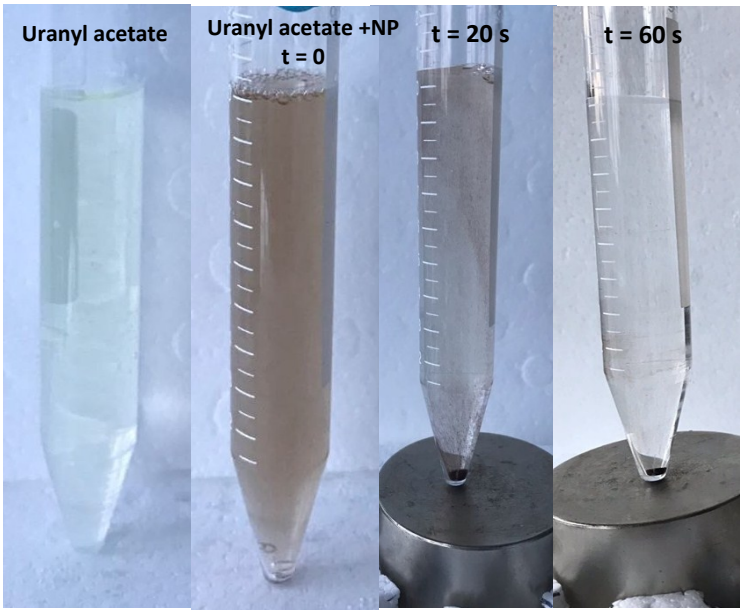

Figure S7: Example of magnetic sedimentation (t = 0, 20 and 60 s) of uranium-loaded SβCD-APTES@Fe_2O_3 nanoparticles by using a supermagnet (magnetic field = 1.3 T).