

Functionalised Magnetic Nanoparticles for Uranium Adsorption with Ultra-High Capacity and Selectivity

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Electronic Supportive Information

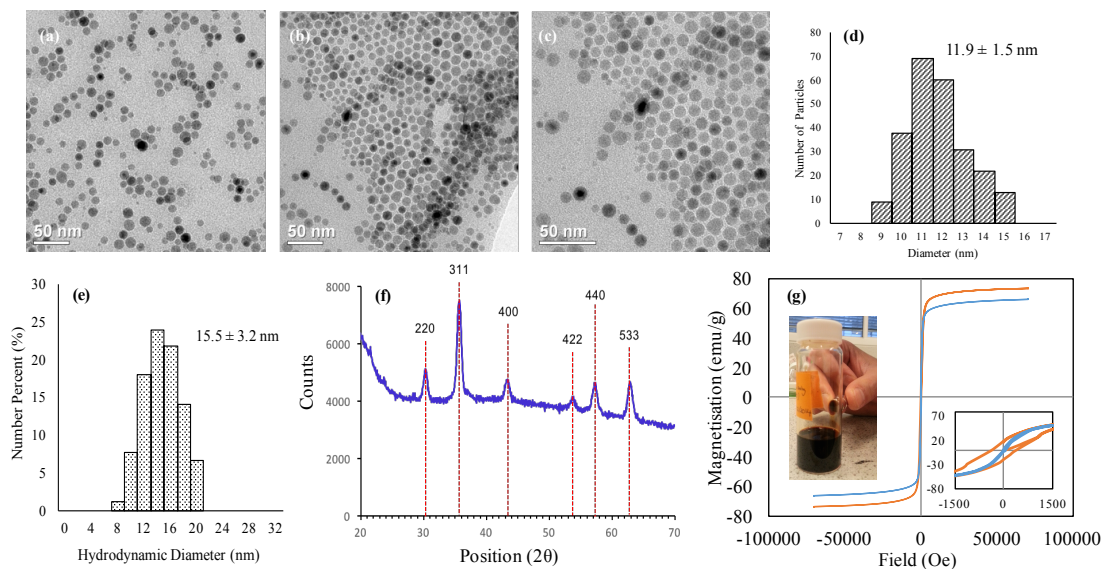


Figure S1: Characterisation of as-synthesised oleic acid-functionalised 12 nm Fe₃O₄ NPs. (a), (b), (c) TEM micrographs of 12 nm oleic acid capped-Fe₃O₄ nanoparticles; (d) size distribution obtained through ImageJ software; (e) size distribution of 12 nm oleic acid capped-Fe₃O₄ obtained from DLS. The larger value compared to TEM results is given by the inclusion of the oleic acid molecule's size (~2 nm) attached on the surface of the particles; (f) XRD pattern at 2θ angle of the OA-Fe₃O₄ NPs marking magnetite characteristic lattice planes (Ref. Code 01-075-1610). (g) Hysteresis loop showing the sample's magnetisation *vs.* applied field curve acquired at 300 K (blue curve) and 5 K (orange curve). The inset shows hysteresis ranging from -1.5 to 1.5 kOe. The inserted picture shows magnetic attraction obtained using a NdFeB 10 mm disc magnet.

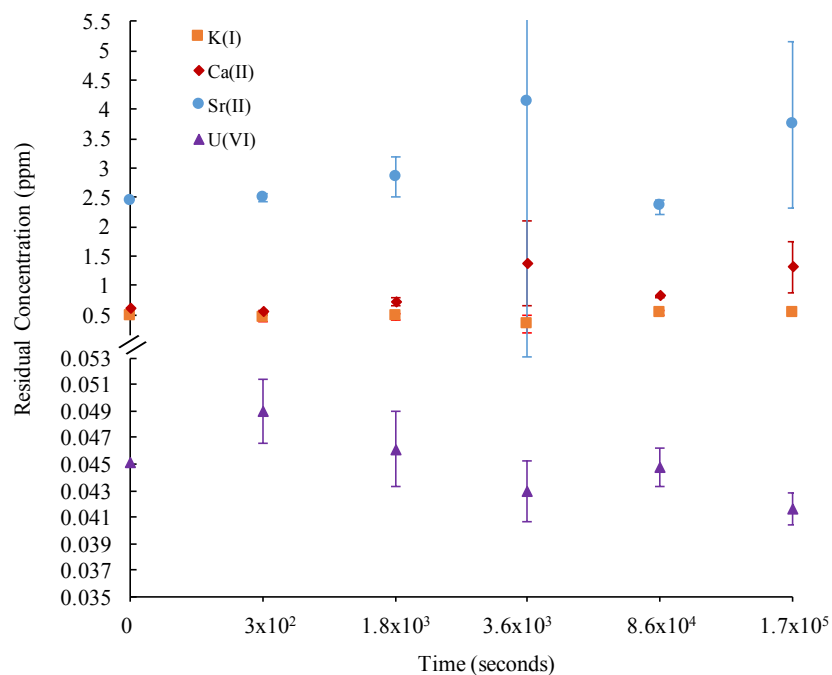


Figure S2: Adsorption of K(I), Ca(II), Sr(II) and U(VI) onto the $(\text{PO})_x\text{-Fe}_3\text{O}_4$ NPs at alkaline conditions (pH 11). The graph was interrupted and scaled for better results appreciation, due to U(VI) initial concentration being extensively lower with respect to competing ions quantities. Contact times of 5 min, 30 min, 1 h, 24 h, 48 h were tested.

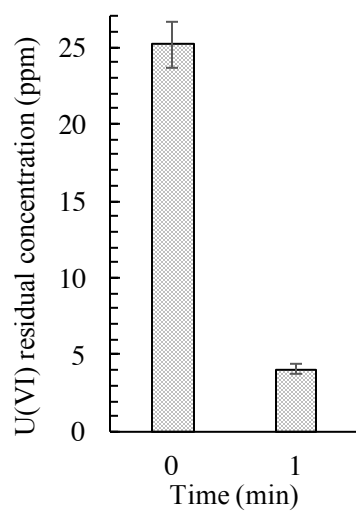


Figure S3: Evaluation of uranium uptake by 0.2 mg of $(\text{PO})_x\text{-Fe}_3\text{O}_4$ NPs upon exposure to air. The sample was equilibrated for 1 minute prior to centrifugation and collection of the supernatant for ICP-OES analysis.