Fabrication of Carbon Nanotubes Decorated with Ultra Fine Superparamagnetic Nanoparticles under Continuous Flow Conditions

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Supporting Information

Synthesis of Fe$_3$O$_4$ nanoparticles using SDP

In a typical synthesis, aqueous solutions of Fe$^{2+/3+}$ precursors were prepared by dissolving FeCl$_2$.4H$_2$O (10 mM) and (20 mM) FeCl$_3$.6H$_2$O (1:2 molar ratios) in deoxygenated ultrapure Mili-Q water. The Fe$^{2+/3+}$ precursors were reacted with deoxygenated NH$_4$OH aqueous solution. The SDP was a Protensive 100 series with integrated feed pumps to direct the reactants onto the rotating disc. Grooved stainless steel disc with 100 mm diameter was used which were manufactured from 316 stainless. The above solutions were delivered onto the disc surface using feed jet both at 0.5 ml/s, using continuous flow gear pumps (MicroPumps), under an atmosphere of high purity (99.9%, BOC Gasses) argon gas, within the sealed reactor chamber. Samples were collected from beneath the disc through an exit port. The samples collected were immobilized with a permanent magnet and supernatant solutions were decanted. Samples were re-dispersed in deoxygenated ultrapure Mili-Q water. This process was repeated at least three times to remove chloride salts.
Figure S1: TEM images of Fe$_3$O$_4$ nanoparticles synthesized using SDP

Figure S2: Magnetization curve of Fe$_3$O$_4$ nanoparticles at 300K

Figure S2, magnetization curve of Fe$_3$O$_4$ nanoparticles synthesized by SDP showed superparamagnetic behaviour at room temperature.