

Supporting Information for Synthesis of superparamagnetic Iron (III) oxide nanowires in double-walled carbon nanotubes

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X-Ray Powder Diffraction Data. XRD analysis was performed in order to clarify the structure of superparamagnetic Iron (III) nanowires. [The sample was deposited on a (111) Si support and analyzed on a Bruker D4 Endeavor diffractometer equipped with a copper source (Cu K α)]. Diffraction peaks corresponding to γ -Fe₂O₃ [JCPDS: 00-039-1346] were identified, although the nanometric size of the encapsulated wires does lead to very wide and low intensity diffraction peaks (Fig. S1). A relevant observation is the absence of Fe-bcc peaks, in agreement with the results obtained by Mössbauer Spectroscopy.

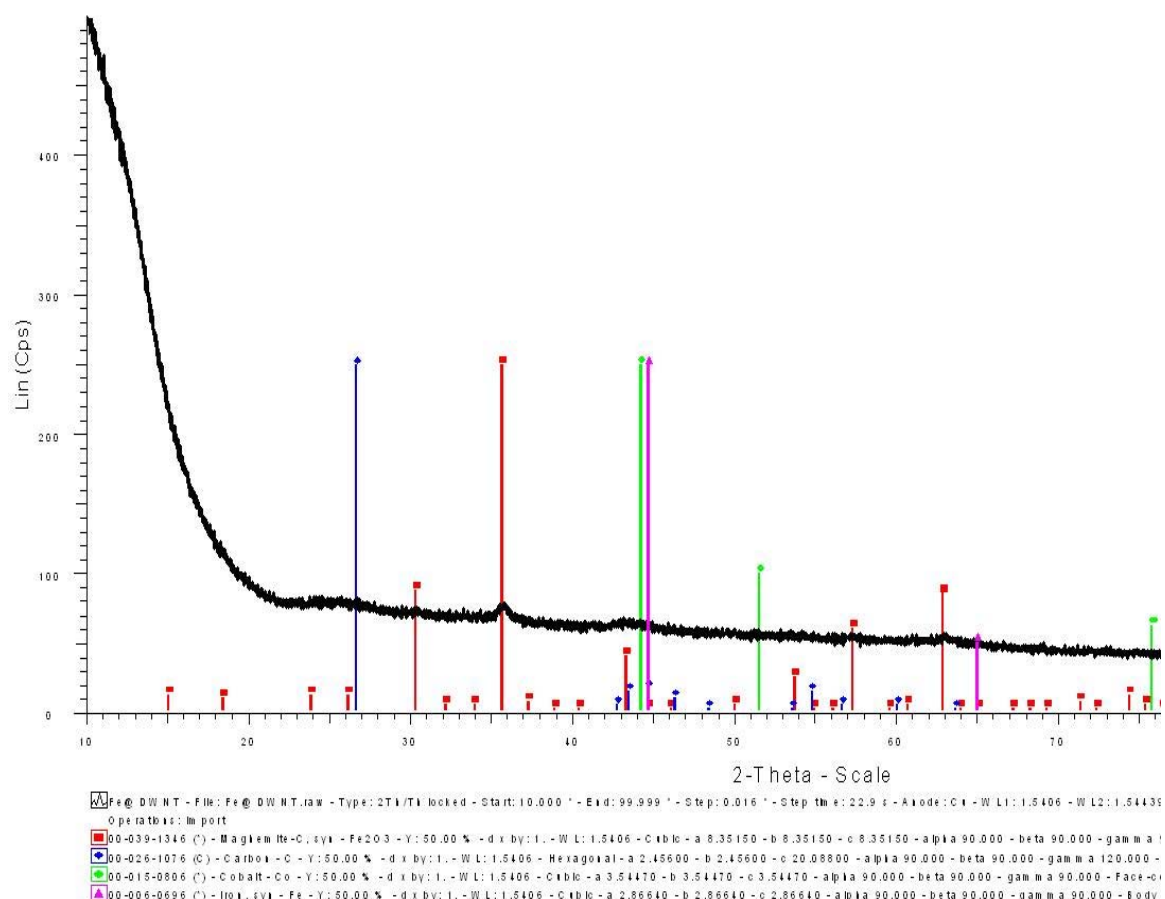


Figure S1: DRX spectrum of DWNT filled with Superparamagnetic (SPM) Iron (III) oxide nanowires (X-Ray source: Cu K α).

Energy Dispersive X-Ray analysis data. EDX Analysis was achieved both before and after the treatment of the $\text{FeI}_2@DWNT$ sample in hydrogen atmosphere. The EDX spectrum obtained before the treatment in H_2 (Fig. S2) confirmed the concomitant presence of both iron and iodine in the sample.

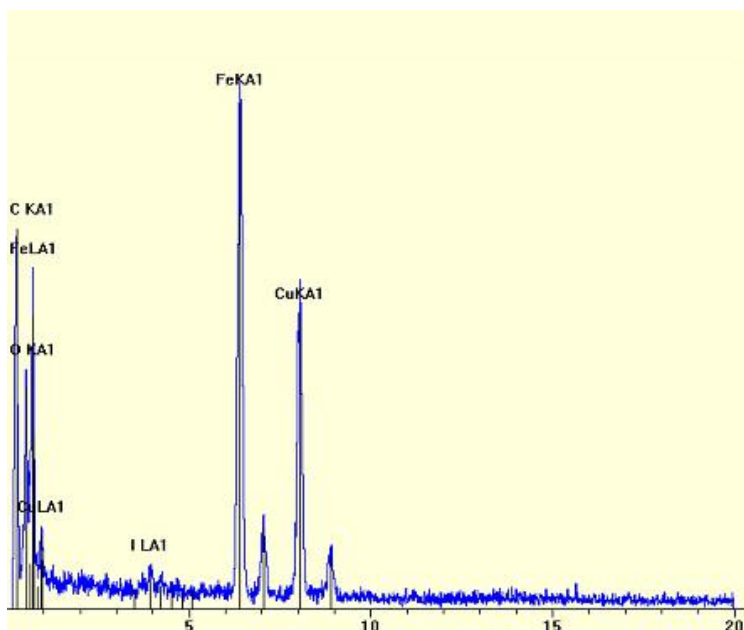


Figure S2: EDX spectrum of $\text{FeI}_2@DWNT$

After the hydrogenation step, the EDX analysis revealed the absence of iodine (Fig. S3) in the sample. The presence of oxygen, also detected, could not be related to the presence of an iron oxide, because the starting DWNT already contained traces of oxygen, as it can be observed in Fig. S2.

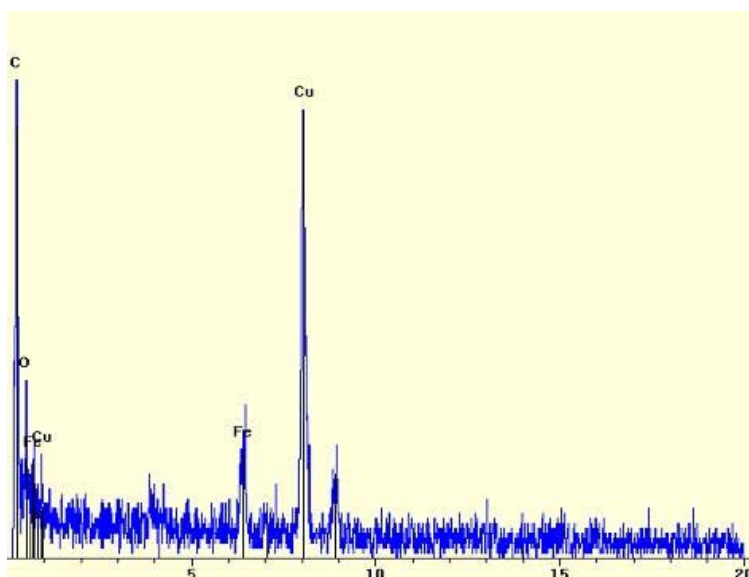


Figure S3: EDX spectrum of DWNT filled with SPM Iron (III) oxide nanowires

Only Mössbauer Spectroscopy data could suggest that the iron within the tubes was in the form of superparamagnetic (SPM) Fe (III) oxide nanoparticles.