

ELECTRONIC SUPPLEMENTARY INFORMATION

## Giant Magnetic Coercivity in Fe<sub>3</sub>C-Filled Carbon Nanotubes

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**INFORMATION ABOUT ELECTRONIC SUPPLEMENTARY MATERIAL.** Presented below is an additional HRTEM micrograph showing the crystallinity of the filling, additional XPS analysis demonstrating the presence of no additional materials and the squareness parameter as a function of temperature. In the squareness the first point of interest is that the values above 5 K are approaching 0.5 which is often seen in the cases where superparamagnetic behaviour is shown to be present. This supports the additional data and conclusions presented in the main text. The more interesting point however, is that the squareness parameter rapidly increases below 50 K. Such a sharp increase reflects the change seen in the coercivity indicating that the same source lies behind the behaviour of both the parameters. Whilst it is not unusual that the squareness parameter and coercivity are interlinked it may be possible to extract more information from the squareness in future work.

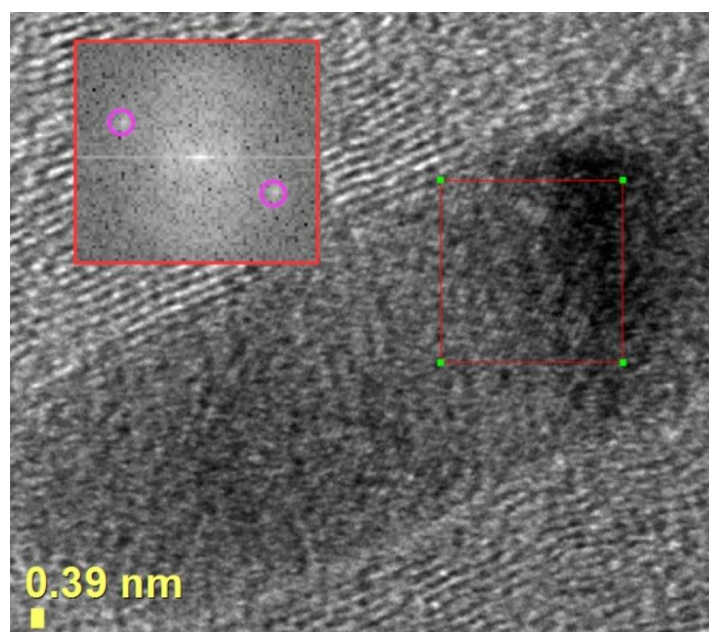


Figure S-1: HRTEM micrograph showing the single crystalline arrangement of the encapsulated Fe<sub>3</sub>C crystal. Note the FFT in inset showing the presence of a single set of reflections (211) corresponding to the lattice spacing of 0.21 nm.

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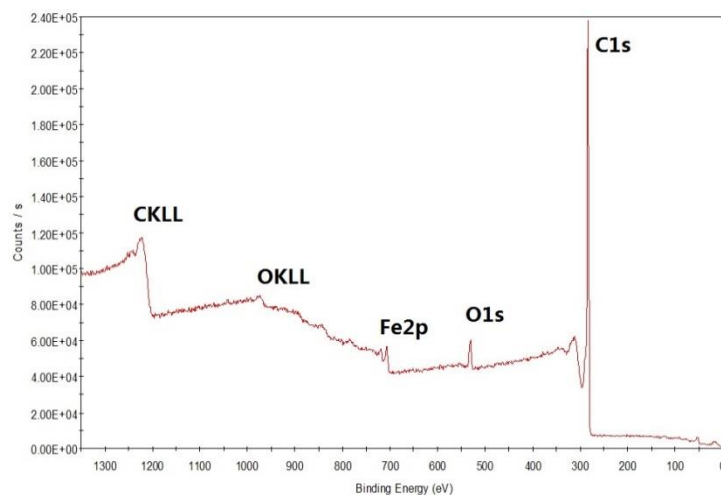


Figure S-2: XPS analyses of the as grown  $\text{Fe}_3\text{C}$ -filled CNTs sample showing the presence of the following atomic %: 95.6% of carbon, 0.97% of Fe and 3.43% of oxygen. Note that the measured percentage of oxygen may be associated to the high porosity of the CNTs walls.

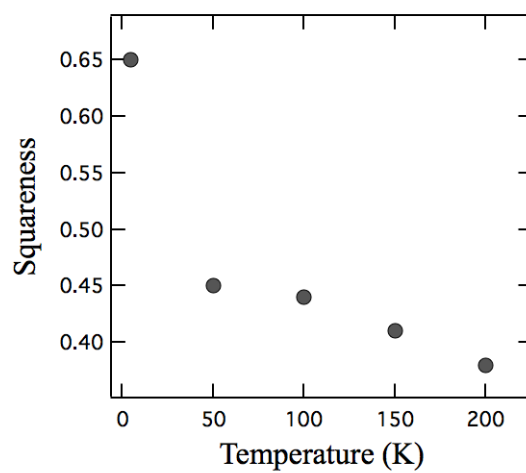


Figure S-3 Squareness parameter as a function of temperature