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Magnetic Properties of Carbon Nanospheres Synthesized by the Chemical Vapour Deposition Technique

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In this study, the magnetic properties of two different sets of carbon nanospheres synthesised by chemical vapour deposition are reported. The morphological and structural features of the carbon nanospheres are characterised by scanning electron microscopy and Raman spectroscopy. The magnetic measurements are performed by a state-of-the-art Physical Property Measurement System. For carbon nanospheres of diameters larger than 400 nm, the results reveal diamagnetic behaviour at high temperatures, and superparamagnetism at very low temperatures. However, ferromagnetic behaviour is observed for carbon nanospheres of diameters lesser than 400 nm. This unusual behaviour in carbon nanomaterials is revealed intrinsic. This is confirmed by the results obtained from both Induced Coupled Plasma Mass Spectrometry and Mössbauer spectroscopy, as well as the calculated saturation magnetisation.

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