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Magnetic properties of carbon nanospheres at low temperatures

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<p>The magnetic and electrical properties of nitrogen doped carbon nanospheres can be probed using Electron Magnetic Resonance (EMR) techniques. Previous Raman spectroscopy studies show that both the pristine and doped spheres are graphitic in character. However, XRD measurement showed that these spheres consist of graphitic crystallites embedded in an amorphous phase. Previous ESR measurements showed large peak on nitrogen doped spheres, implying that the nitrogen occupies substitutional sites in graphitic lattice. The EMR measurements clearly showed large Curie-type paramagnetism at low temperatures for all the samples investigated. The EMR peak-to-peak linewidth have provided evidence of the phonon bottleneck effect in one of the sample investigated, meaning to say that there is a strong interaction between localized and conduction electrons. The broadening of linewidth may be manifested by a Korringa type interaction whereby the spin-lattice relaxation time T₁ is inversely proportional to the temperature. The sample with the highest concentration of nitrogen behaves very differently from the other samples studied in th temperature range 77 K to 300 K, and this behaviour is not well understood at present. This may involve contributions from electron scattering with stationary nitrogen impurities, and therefore different spin relaxation mechanisms which are related to the Elliot and Yafet mechanisms.

Level (Hons, MSc,
   PhD, other)?

MSc

Consider for a student
   award (Yes / No)?

Yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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