

Magnetometry and NMR Study of Carbon Nanopowders Doped with Cobalt Nanoclusters and Self-assembly of their Polymer Nanocomposites under Magnetic Field

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The preparation of magnetic carbon nanoparticles (CNP) with a core-shell structure, attracted a special attention due to their unique physical and chemical properties and the potential for a variety of applications. The possible field of application of magnetic carbon nanopowders is enormous: as sensors, nanolubricants, nano-biotechnology, magneto-optical devices, etc. The structural study of the synthesized carbon magnetic nanopowders showed their spheroid core-shell type structure with the diameter of 150-250 nm doped by 50-60 nm magnetic nanoclusters. In this work we show that the simple radio-frequency (RF) resonant magnetometry [1,2] and the NMR technique using the additional exciting magnetic video-pulses [3] could be used for fast assessment of magnetic properties of a batch of carbon cobalt nanopowders synthesized by pyrolysis of different hydrocarbons. The RF resonant magnetometry technique could be used for a simple non-contact study of the self-assembly processes under magnetic fields in polymer composites synthesized using these carbon cobalt nanopowders.

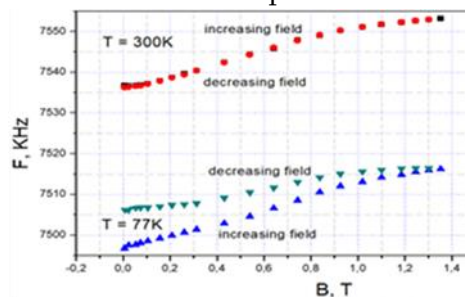


Figure 1. Temperature dependence of RF resonant magnetometer frequency with a carbon nanopowder sample doped by cobalt nanoclusters at increasing and decreasing magnetic fields.

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References

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