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NMR-IN-MAGNETICS AS USEFUL TOOL FOR INVESTIGATION OF LOCAL STRUCTURE OF MAGNETIC NANOMATERIALS

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The lecture is devoted to nuclear magnetic resonance (NMR) in the magnetically ordered state also known as NMR in magnetics or spin echo, or FNR. This technique possesses a potential for effective investigation and testing of various magnetic materials, especially in the nanocrystalline and/or in nanocomposite state. In the first part of the lecture an introduction is done to basic physics of pulse NMR in magnetics together with a brief description of the method development since its appearance, about 60 years ago. The method was successfully applied to a lot of magnetics such as metallic cobalt and cobalt-containing materials, including films, multilayers and nanoparticles; various ferro- and ferrimagnetic compounds, Heusler alloys, intrinsically inhomogeneous perovskite-like CMR manganites etc. Several works of different years demonstrate that NMR technique is the useful addition to well-known diagnostic methods of magnetic materials and allows one to get unique information. In the second part of the lecture we review applications of the technique to some novel magnetic structures/materials during the last few decades. We describe a determination of the core-shell structure of bimetallic FeCo nanoparticles, an observation of ferromagnetic clusters in spin-glass manganites far above Curie temperature, molecular magnets i.e., array of molecular complexes with several 3d-metal ions, Mn-doped magnetic semiconductors, and a detection of zero-field 13C NMR signal in so-called magnetic carbon i.e., in carbon-based magnetic materials free from metallic elements.

BIOGRAPHY

Vladimir V Matveev has completed his PhD from Semenov Institute of Chemical Physics of USSR Academy of Sciences. He is a Senior Researcher of Department of Nuclear-Physics Investigation Techniques of Saint Petersburg State University, Russia. He has published more than 25 papers in reputed journals and made a lot of reports/lectures at international conferences.

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