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## Studies of Macro-, Micro- and Nanodiamonds by HF EPR/ENDOR

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Magnetic resonance methods are the basic techniques for studying spin phenomena in condensed matter and biological systems. Spin phenomena are playing a crucial role in the development of devices based on nanostructures. Nanoparticles are also widely used in different kind of technologies and medicine - for transfection, gene silencing, photodynamic therapy, drug delivery, etc. Since 2009 in the EPR division of the Centre of the Shared Facilities of Kazan Federal University we investigate various nanostructures. In this report we present systematically studied representative classes of macro-, micro- and nanodiamonds. Among the results obtained we highlight the following.

Paramagnetic centers of substitutional nitrogen in micro- and nanocrystalline diamond particles have been identified and separated by pulsed EPR at room temperature. A novel approach based on EPR analysis of nanodiamond was suggested for efficient separation of EPR signals from paramagnetic centers within the nanocrystals' core from those localized on the nanoparticle surface. Extremely high concentrations up to  $10^4$  ppm (1%) of NV centers were observed in sintered clusters of nanodiamond, which allow one to fabricate structures with one NV center per nm<sup>3</sup>.

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