

International Conference
Condensed Matter Research at the IBR-2

Dubna,
Russia

ABSTRACT

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Functional and Nanostructured
Materials

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Development of Neutron Scattering
Techniques and Instruments

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Soft Condensed Matter

Carbon-based Materials

Dynamics of Materials

Magnetic Nanomaterials

Neutron Imaging

Materials under Extreme Conditions

Texture and Stress
Investigations of Materials

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2020

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SYNTHESIS OF ROD-LIKE AND SPHERICAL MAGNETITE NANOPARTICLES ASSISTED BY MAGNETIC FIELD

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In this work, we study the effect of pH on the synthesis of magnetite (Fe₃O₄) nanorods assisted by external magnetic field. We use reverse co-precipitation of Fe³⁺ and Fe²⁺ ions to obtain magnetic nanoparticles. Synthesis of the magnetite phase is confirmed by electron diffraction and Raman spectroscopy. The morphology of the synthesized nanoparticles strongly depends on the pH of the reaction medium, e.g on the amount of OH⁻ ions in the reaction mixture. As shown by TEM, magnetite nanorods are synthesized at the comparable amounts of iron ions and hydroxyl ions, whereas spherical nanoparticles are obtained at the excess of OH⁻ ions. Magnetite nanorods are single crystals, and they are presumably formed by the magnetic assembly of building blocks – small hexagonal faceted magnetite nanocrystals, which are formed at the first step of the reaction.

The study offers a prospective way towards a facile, green and controllable method of anisotropic magnetic nanoparticles production in the absence of a stabilizer (like surfactant or polymers), which is important for modification of their surface or incorporation into polymer nanocomposites.

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