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POSTER ABSTRACT PRESENTATIONS

SESSION TITLE: ADVANCES IN EM TECHNOLOGY AND PROCESSING

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Abstract P-7: NdFeCo-based Nanoparticles for Biomedical Applications

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Background: The multifunctional nanoparticles can be promising antitumor materials. The results of a study of synthesized NdFeCoB oxide nanoparticles (NPs) as a basis for drug transportation systems are presented. In the next step, the NPs can be coated by a multifunctional gel shell.

Methods: NPs, the composition of NdFe_xCo_{1-x}B (where x = 0, 0.05, 0.1, 0.2, 0.3, 0.4, and 0.5), were synthesized by a Pechini-type sol-gel method. The synthesis allows tuning of NPs magnet properties by manipulating the microstructure and phase composition. NPs were studied by XRD, SEM, TEM, HRTEM, and VSM.

Results: SEM images show that the average size of NPs changed from 280 nm (for x = 0) up to 416 nm (for x = 0.1 – 0.5). At TEM images the NPs of the sample without cobalt (x = 0) have an elongated shape (Fig 1a). Diffraction patterns showed that the NPs consist of single crystal or ordered crystallites. NPs with cobalt mainly consist of crystallites with a size of about 20-50 nm. There are also areas with a complex-grained microstructure. Hysteresis loops and first-order reversal curve analysis indicated that the NPs were ferromagnetic whose coercivity, squareness ratio, and magnetic interactions changed significantly with the cobalt contents.

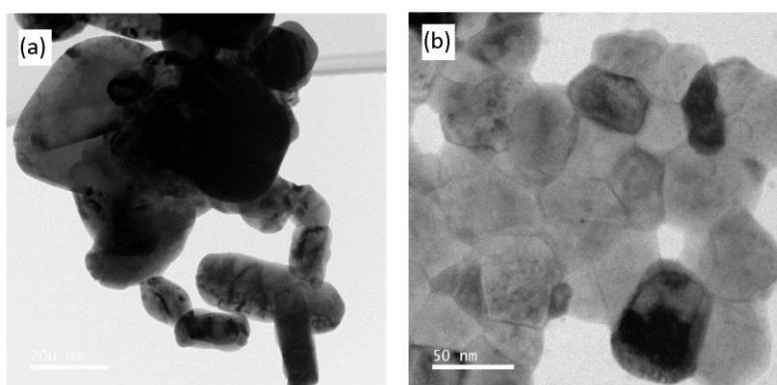


Fig. 1. TEM images of NdFe_{1-x}Co_xB oxide particles with x=0 (a) and 0.5 (b)

Key Words: magnetic nanoparticles • biomedicine • crystal structure

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