International Journal of Biomedicine | June 2021 - Volume 11, Issue Suppl_1: Abstracts from the Third Russian International Conference "Cryo-electron microscopy 2021: achievements and prospects"

POSTER ABSTRACT PRESENTATIONS

SESSION TITLE: ADVANCES IN EM TECHNOLOGY AND PROCESSING

DOI: 10.21103/IJBM.11.Suppl_1.P8

Abstract P-8:Fe_2O_3-SiO_2-Au Core-Shell Nanoparticles for Theranostics

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Background: Core-shell nanoparticles (NPs) Fe_3O_4-SiO_2 covered with Au grains due to their unique magnetic, biological, optical and mechanical properties are promising nanostructured material especially in biomedical field. Magnetic core allows controlling the position of NPs, SiO_2 shell makes them biocompatible and decrease magnetostatic interactions between them, and Au NPs on the surface allow creating additional matrix around them and using such systems as controlled nanocontainers in tasks of drug delivery, magnetic resonance imaging and target cancer cell therapy.
Methods: Inner magnetic core of the NPs was synthesized using polyol method, a 3-step process which resulting in magnetite NPs with hydrophilic surface. Shell was made by covering Fe_3O_4 particles in surfactant and growing SiO_2 on top of them by sol-gel method. Covering core-shell NPs with 3.5 nm Au seed grains using monosilane and their further growth to control diameter. Structural properties were studied using TEM and Dual Beam SEM. Magnetic properties were investigated using LakeShore VSM 7400 magnetometer.
Results: Two samples with different concentration of Au NPs were investigated. SEM observations show that core-shell Fe_3O_4-SiO_2 are spherical with average diameter of 200 nm and Au NPs with diameter of 15 nm are evenly dispersed on their surface. Magnetic measurements showed that different concentration of Au NPs results in different coercive forces of the sample. Decreasing the temperature to 77 K showed up to 6 times increase of coercive force and slight increase in magnetization.

Conclusion: Biocompatible magnetic nanoparticles are critical advances in biomedical applications. In this work, we studied the morphology of the samples, demonstrated the change of coercive force of NPs with different Au concentration and investigated their magnetic properties in low temperatures.

Key Words: magnetic nanoparticles • biomedicine • low temperature • cancer cell therapy

Authors would like thank the support of the Russian Ministry of Science and Higher Education under the state task (0657-2020-0013)

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International Journal of Biomedicine. 2021;11 Suppl 1: S14.
doi: 10.21103/IJBM.11.Suppl_1.P8