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Book of Abstracts

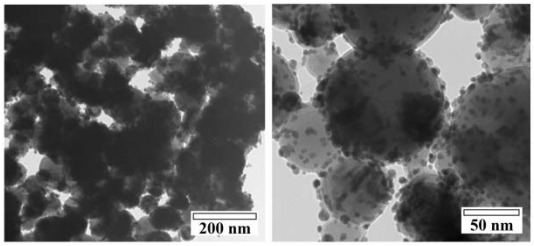

Fig. 1. TEM images of iron NPs decorated with Au NPs

Then, an AS14 aptamer specific for Ehrlich ascites carcinoma was attached to the decorated Fe-Au NPs. Preliminary experiments on mice showed the effectiveness of Fe-Au-AS14 NPs in tumor magnetodynamic nanotherapy compared to Fe@Au NPs (NITmagoldCit 50nm, Nanoimmunotech, Spain).

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Magnetic Properties of Iron Oxide Nanoparticles to Create Aptamer-Based Bionanoconjugates

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Recently, bionanoconjugates based on magnetic nanoparticles and aptamers are increasingly being used for problems of theranostics, such us drug delivery systems, MRI contrast agent, hyperthermia and magneto mechanical destruction of cancer cells. Various modifications of iron oxides are widely used as magnetic nanoparticles. Most often it is Fe_3O_4 (magnetite), but despite the huge number of advantages, their good chemical stability and a wide range of production technologies, the properties of the resulting nanoparticles strongly depend on the method of preparation and require additional study.

In this work, a series of samples of iron oxide nanoparticles obtained by laser ablation, and subjected to further annealing up to 600° C, in increments of 50° C has been studied extensively by various analytical methods.

Nanoparticles morphology studies were performed on a Hitachi TM 5500 transmission electron microscope equipped with an EDS attachment.

Measurements of the magnetization of the samples were carried out at room temperature using a vibration magnetometer.

Magneto-optical and absorption spectra were obtained at room temperature in the range of 350-1100 nm on an apparatus for spectropolarimetric studies developed at the IPH SB RAS based on the MDR-2 monochromator. Field up to 15 kOe, spectral resolution is 1 nm.

The Mössbauer spectra of the samples under study were obtained in transmission geometry with a Co57 radioactive source at room temperature. Processing was carried out in two stages. At the first stage, possible nonequivalent iron positions in the samples were determined by calculating the probability distributions of hyperfine fields. In accordance with the results obtained, a preliminary model spectrum was formed. At the next stage, the model spectrum was adjusted to the experimental one. As can be seen from the figures - each spectrum includes several components.

About TEM images we calculated the distribution of particles in shape and size. Magnetic measurements show particle behavior close to superparamagnetic. Thus, it was possible to realize and compare with the changes magnetic and magnetooptical properties the phase transformation of iron oxide nanoparticles from magnetite (Fe_3O_4) in the initial sample to hematite (α-Fe_2O_3) during annealing of 600° C.