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## Ferromagnetic nanotubes as carriers for targeted delivery of drug and protein

Detailed studies of ferromagnetic nanotubes synthesis process, morphology, structure and magnetic parameters were carried out to understand potential of their bioapplications as carriers for targeted delivery of drug and protein. Morphological parameters such as elongated shape, low specific density and large specific surface are advantages of ferromagnetic nanotubes in comparative with another type of magnetic carriers. Uniform magnetic field, large magnetization at low magnetic fields and magnetic anisotropy of nanotubes will guarantee their predictable behavior in the biological liquids flow. Protection nanotubes surface from oxidation and degradation processes in biological liquids is very important for a practical application. Oxidation leads to compounds formation which could be toxic and harmful to organic cells and could affect on the structure and magnetic properties. To solve these problems, the covering process of ferromagnetic nanotubes with polymers and organosilicon compound (3-aminopropyl)trimethoxysilane was developed. Moreover, the cytotoxicity studies of coated and uncoated ferromagnetic nanotubes was provided to understand influence on the biological media. Safety of the tested samples for living cells was shown. Finally, the scheme of drugs attaching to the nanostructured surface was developed.

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