**Structural characterization of biocompatible magnetic nanoparticles in bulk and at interface by neutron scattering methods**

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**Abstract.** In this talk, first I will show basic principles and short description of neutron scattering methods, namely neutron reflectometry (NR) and small-angle neutron scattering (SANS), for nanoscale characterization in bulk and at interfaces. It`s well known that neutron scattering methods are powerful techniques for structure diagnostic of various objects within length scale 1-100 nm. In particularly, possibilities of NR and SANS for studying the magnetic nanoparticles and its complexes with macromolecules will be presented according to experimental data. The structural analysis of various types of magnetic fluids (MFs) will be shown in the given talk. Additionally the interaction characteristics between surfactant/polymer molecules used in stabilization of MFs are investigated, which is very important for understanding the synthesis procedure of highly stable magnetic fluids with controllable properties. The adsorption of surfactant coated magnetic nanoparticles from highly stable magnetic fluids on crystalline silicon was studied by NR. Two types of MFs based on nanomagnetite (co-precipitation reaction) dispersed and stabilized in a non-polar organic solvent (coating by oleic acid) and a strongly polar solvent (coating by sodium oleate and also modified by poly(ethylene glycol)) were considered. It was obtained that along with the structural stability in bulk the considered MFs are characterized by the interface stability as well. No any adsorption of nanoparticles was detected from reflectometry experiments in the case of large and developed fractal in the ferrofluid with PEG addition. Finally, I will show some results for complex analysis of the magnetoferritin structure in wide range of loading factor, solutions pH and synthesis temperature; as well as the structure of lysozyme amyloid fibrils at various conditions.

**Viktor I. Petrenko, Ph.D.** received his M.S. degree in Molecular Physcis from Taras Shevchenko Kyiv National University (Ukraine) in 2005. Work was devoted to structural investigation of lipid bilayers with various chain length alcohols by neutron diffraction. In September 2008, he was awarded his Ph.D. degree for research of magnetic fluids and surfactants which are used for its stabilization by small-angle neutron scattering study. From 2006 he entered Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research (Russia) where he became involved in the structural investigation of various kinds colloidal solutions. From 2013 he was GRAINS group leader at FLNP, JINR. The main topic of the research is structural characterization of bio-related complexes; magnetic colloidal systems; polymers and surfactants solutions; nanocomposite materials and layered nanostructures; development of new methods for investigation and diagnostics of nanosystems by neutrons scattering. For the moment, he is actively participated in neutron scattering experiment of planar and developed electrochemical interfaces. Currently, he is Ikerbasque Research Fellow in Basque country, Spain.