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Structural characterization at nanoscale

V.I. Petrenko^{1,2}

*¹BCMaterials, Basque Centre for Materials, Applications and
Nanostructures, Leioa, Spain*

²IKERBASQUE, Basque Foundation for Science, Bilbao, Spain

Possibility of neutron and X-ray scattering methods for structural investigations at nanoscale will be discussed in detail according to our huge experience over the last 10 years on the application of neutron&X-ray scattering for structural characterization of systems with magnetic nanoparticles (MNPs). Namely, results of neutron reflectometry (NR) and small-angle neutron scattering (SANS) for nanoscale characterization of magnetic nanoparticles in bulk and at interfaces will be shown. Also basic principles of small-angle scattering and reflectometry techniques will be explained. The structural analysis of various types of magnetic fluids (MFs) with different type MNPs will be described in details during the presentation. Additionally the interaction characteristics between surfactant/polymer molecules used in stabilization of MFs were investigated, which is very important for understanding the synthesis procedure of highly stable magnetic fluids with controllable properties. Also effect of external magnetic/electric fields on the behavior of MNPs will be presented according to the neutron scattering data. Future prospects of neutron scattering methods for structural characterization of systems with MNPs and nanofluids for high voltage engineering will be discussed as well.