**Self-assembly in nanocomposites**

**Natália Tomašovičová**

Institute of Experimental Physics, Slovak Academy of Sciences, Watsonova 47, Košice Slovakia.

nhudak@saske.sk

**Abstract.** The idea of ferronematics (FNs) – nematic liquid crystals doped with magnetic nanoparticles in low concentrations – originally comes from F. Brochard and P.G. de Gennes with the intent to increase the (otherwise low) magnetic sensitivity of liquid crystals. The experimental realization of these composite materials in a stable form took decades of efforts, and is still in progress.

Currently, one of the hot topics of the worldwide research is to design nanomaterials that are capable to assemble into functional superstructures in multiple direction. Liquid crystals themselves are prominent example of materials in which the self-organization (self-assembly) appears spontaneously on different scales. Besides the local ordering on the molecular level, they may form micro/macroscopic superstructures. Self-organization is universal in nature and has an indisputable importance covering all fields of natural sciences, and has also a deep impact in social sciences e.g., in economics, sociology, anthropology, psychology, phonology, etc.

In this talk, I will present the approach to the research of FNs from a completely different aspect – from the perspective of self-organization, where a form of overall order arises due to the local interactions between the components of an initially disordered system. I will concentrate on different length scales on those self-organization processes and effects which are absent, or considerably modified in the absence of the magnetic nanoparticles. i.e., the magnetic nanoparticles are used as an organizing medium to induce/modify the self-assembly. The presented results involve composite systems based on both thermotropic and lyotropic liquid crystals doped) with magnetic nanoparticles of various shapes and sizes.

** Dr. Natália Tomašovičová** received her M.S. degree at Faculty of Natural Sciences, University of Pavol Jozef Safarik in 1988. In 1997, she was awarded her PhD. degree for research in high temperature superconductivity at the Institute of Experimental Physics, Slovak Academy of Science. Since 1999 she has been investigating phenomena and physical properties of magnetic fluids. She also participated on the establishment of laboratory of infrared and Raman spectroscopy and microscopy, where she works currently as a responsible person. At present, she is a head of Department of Magnetism. Her research activities are focused on study of fine magnetic particles, magnetic fluids and their composites. During her scientific career she completed several short term abroad stays at leading institutions as Academia Sinica in Taiwan or Joint Institute for Nuclear Research in Russia. Since 1991 till 1993 she worked as a research worker at Solid State Chemistry Laboratory of CNRS in Bordeaux, France. Her research results were awarded i.e. as young investigator by Slovak Academy of Sciences, appreciation of Slovak Academy of Sciences for scientific work in the field of drug targeting delivery.