

(Nanocomposites and nanomaterials)

Ferronematics- nanofluids based on liquid crystals and magnetic nanoparticles

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Liquid crystals (LCs) are very sensitive to application of an external electric field due to the large value of dielectric anisotropy, whereas they are practically insensitive to application of magnetic field. About 5 decades ago the idea was born to mix nano-sized magnetic particles (MPs) with nematic liquid crystals (LCs), in order to get fluids with a large magnetic susceptibility called ferronematics (FNs). In the presentation will be illustrated basic theory with description of these materials, especially many experimental data regarding structural changes so called Fredericksz transitions, response of these system to magnetic field especially to linear response in low magnetic field region [1], nematic- isotropic transition (T_{I-N}) in presence of magnetic field as well as the idea how to prepare liquid ferromagnets based on FNs. Behavior of these systems near T_{I-N} in the presence of very small magnetic field opens the doors towards application possibilities such as low magnetic field sensors [2] or basic logical elements for information storage technologies. This is the way to obtain magnetovision camera with the possibility of mapping the magnetic field in space.

1. Tomasovicova, N., Timko, M., Mitroova, Z., Koneracka, M., Rajnak, M., Eber, N., Toth-Katona, T., Chaud, X., Jadzyn, J., Kopcansky, P. *Capacitance changes in ferronematic liquid crystals induced by low magnetic fields // Phys. Rev E.-2013.-87.-P.01450.*

2. Tomasovicova, N., Kovac, J., Raikher, Y., Eber, N., Toth-Katona, T., Gdovinova, V., Jadzyn, J., Pincak, R., Kopcansky, P. *Biassing a ferronematic- a new way to detect weak magnetic field // Soft Matter-2016.-12.-P.5780.*