

Nanocomposites and nanomaterials

Dispersions of carbon nanotubes in liquid crystal matrices containing photosensitive components

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A review is presented on studies of carbon nanotube (CNT) dispersions in various liquid crystal matrices, including our works on peculiar features of optical and dielectric properties of different types of CNTs in nematics [1] and CNT dispersions in cholesterics, where helical twisting stabilizes the system, suppressing the aggregate formation [2].

Special attention is paid to our recent results on CNT dispersions in liquid crystal matrices with optically sensitive components. Several cases of non-trivial behavior are reported. The optical density of CNT dispersions in mixtures of cholesterics and azoxy nematics as function of CNT concentration was essentially non-linear (as distinct from such dependencies in the nematic systems), with a pronounced minimum at concentration where formation of stacking-type CNT aggregates could be expected. This minimum was reversibly shifted under UV irradiation of appropriate wavelengths, as well as the cholesteric selective reflection band. Various texture transformations with pronounced changes in conductivity and dielectric permittivity could be realized in these systems, opening a way for a set of novel “photoelectrooptic” effects that are promising for application in optoelectronic devices.

1. *Lisetski L.N., Fedoryako A.P., Samoilov A.N., Minenko S.S., Soskin M.S., Lebovka N.I.* Optical transmission of nematic liquid crystal 5CB doped with multi-walled and single-walled carbon nanotubes // *Eur.Phys.J. E* -2014.-**37**, No.8.-P. 68-1-7.

2. *Lebovka N.I., Lisetski L.N., Nesterenko M.I., Panikarskaya V.D., Kasian N.A., Minenko S.S., Soskin M.S.* Anomalous selective reflection in cholesteryl oleyl carbonate – nematic 5CB mixtures and effects of their doping by single-walled carbon nanotubes // *Liquid Crystals* -2013.-**40**, No.5.-P. 968-975.