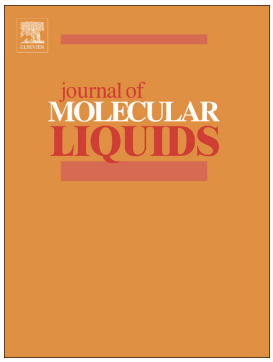

Effect of ZnO nanoparticles on the morphology, dielectric, electro-optic and photo luminescence properties of a confined ferroelectric liquid crystal material

Divya Jayoti, Praveen Malik, S. Krishna Prasad

PII: S0167-7322(17)34451-3
DOI: doi:10.1016/j.molliq.2017.12.035
Reference: MOLLIQ 8331

To appear in: *Journal of Molecular Liquids*

Received date: 25 September 2017
Revised date: 27 November 2017
Accepted date: 8 December 2017

Please cite this article as: Divya Jayoti, Praveen Malik, S. Krishna Prasad , Effect of ZnO nanoparticles on the morphology, dielectric, electro-optic and photo luminescence properties of a confined ferroelectric liquid crystal material. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2017.12.035

Effect of ZnO nanoparticles on the morphology, dielectric, electro-optic and photo luminescence properties of a confined ferroelectric liquid crystal material

[1]Divya Jayoti, *[1]Praveen Malik and [2]S. Krishna Prasad

[1]Liquid crystal Lab, Dr B R Ambedkar National Institute of Technology, Jalandhar, 144011, India

[2]Centre for Nano and Soft Matter Research, Jalahalli, Bangalore 560013, India

Corresponding Author Email- malikp@nitj.ac.in

Abstract

The influence of spherical zinc oxide nanoparticles (ZnO-NPs) incorporated in low concentrations (0.45, 0.7, 1.0 wt./ wt. %) into a polymer confined ferroelectric liquid crystal (FLC) has been investigated. Varying the concentration of ZnO- NPs is found to have a profound impact on the morphology of the polymer dispersed ferroelectric liquid crystal (PDFLC) composites. With increasing ZnO- NP content, the real and imaginary parts of the permittivity and the dielectric strength of a relevant relaxation mode depict an increase. However, the associated relaxation frequency shifts to lower values; a concomitant increase in spontaneous polarization is also observed. The response time of the composites slightly improved on doping with the ZnO-NPs. The changes in electro-optic and dielectric parameters are explained in terms of change in elastic energy as well as surface morphology of the composites. Interestingly, the polymer/liquid crystal environment is also seen to enhance the photoluminescence response of confined FLC.

Keywords: polymer dispersed ferroelectric liquid crystal, ZnO-NPs, morphology, dielectric relaxation, spontaneous polarization, photoluminescence spectroscopy.

Introduction