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Dielectric anisotropy properties of nanostructure metal oxide semiconductor and 4-4'-n-pentylcyanobiphenyl based on nano-nematic composite systems

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Abstract

Dielectric anisotropy properties of SnO₂, ZnO and Fe₂O₃ nanoparticles doped into 4-4'-n-pentylcyanobiphenyl (5CB) composite liquid crystals have been investigated. The dielectric anisotropy parameters and splay rotation coefficient of the 5CB nematic liquid crystal were improved by doping of SnO₂, ZnO and Fe₂O₃ nanoparticles. The prepared nano-nematic composites exhibited p-type Delta epsilon at room temperature. The highest Delta epsilon value was found to be for Fe₂O₃ nanoparticles. The prepared nano-nematic composite systems exhibited an increase in the critical dielectric anisotropy transition frequency from 800 kHz to 1 MHz. The increase in Delta epsilon of the 5CB is due to the dipolar interaction between nanoparticles and liquid crystal molecules. The obtained results indicate that the new liquid crystals having high dielectric anisotropy can be prepared with the nanoparticles doping for the liquid crystal displays. (C) 2013 Elsevier BM. All rights reserved.

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