

Phase diagram and Fredericks transition in nanocomposites of a liquid crystal and quantum dots

S.B. Atata, I. Lelidis

Section of Condensed Matter Physics, Department of Physics, National and Kapodistrian University of Athens, Panepistimioupolis, Zografos, 15784 Athens, Greece

We investigate the effect of quantum dots on the ordering of liquid crystals by means of polarized optical microscopy and electrooptical measurements. Specifically, nanocomposites of the 4-cyano-4'-octylbiphenyl liquid crystal with core-shell CdSe/ZnS quantum dots were prepared. The phase diagram of the nanocomposites as function of the quantum dots' concentration was constructed. A narrowing of the nematic phase temperature window was measured along with a drop of the clearing temperature. Microphase separation effects and the formation of a network of quantum dots appear above a critical concentration. The Fredericksz threshold, switch-on and switch-off times were determined as a function of the quantum dots' concentration. The influence of the quantum dots' size was evaluated.