Holographic recording in chiral and linear isomers of single-component phototropic liquid crystals: an experiment and theoretical approach.

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Streszczenie

Phototropic liquid crystals (PtLC) comprising one component are a new class of liquid crystals (LC) which due to the phenomenon of photochemical phase transition are of special interest, especially in view of their potential applications in photonic devices. So far, however, only a little attention has been paid to these materials. In this paper, we discuss holographic recording in chiral and linear single-component PtLCs from the family of 4-alkyl-4′-alkoxyazobenzene and we develop the one-dimensional mathematical model describing the formation of the diffraction grating. The grating formation process and its dynamics, resulting from the photoinduced isotropic-to-nematic phase transition, have been described by the mechanism that assumes the formation and growth of the liquid-crystalline domains of different sizes induced by the sinusoidally modulated Gaussian light intensity distribution. We show that the model is based on one parameter, that is *the incubation time* which can be easily obtained experimentally and which can be used for the fitting of the experimental data. Reporting new PtLCs materials and the model that describes the processes of holographic recording in these types of materials can be useful in the design of new phototropic LC materials and for optimisation of the experimental conditions.

Słowa kluczowe

Phototropic liquid crystal, azobenzene liquid crystal, photoinduced phase transition, holographic recording, diffraction grating, isotropic-to-nematic phase transition

Adres publiczny

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