Cholesteric gratings induced by electric field in mixtures of liquid crystal and novel chiral ionic liquid.

Autorzy

Maciej Czajkowski

J. Klajn

Joanna Cybińska

Joanna Feder-Kubis

Katarzyna Komorowska

Rok wydania

2017

Czasopismo

Liquid Crystals

Numer woluminu

44

Strony

911-923

DOI

10.1080/02678292.2016.1254825

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Formation of gratings upon alternating electric field in compositions of highly birefringent liquid crystal (LC) with novel chiral ionic liquid (CIL) enclosed in 10-μm-thick cells is studied. The compatibility of two organic components of the mixture is investigated. The grating is formed in 1–5% CIL mixtures and causes significant changes of the transmission of polarised light through the cells. Transmission of polarised λ = 633 nm light through the 5% CIL sample is studied with respect to frequency (1 Hz–3 MHz) and amplitude (up to 10 V) of alternating voltage and the results are used for sketch a voltage–frequency phase diagram. Two possible ways of formation of the gratings with perpendicular orientation to that formed from initial state are presented. Two twisting axes in the molecular alignments of the cholesteric LC gratings with perpendicular directions are proposed. Optical switch based on four different states of LC including two gratings with perpendicular directions is proposed. Moreover, behaviour of the rotation of a grating induced by AC field in hybrid planar-homeotropic cell is studied in two frequency regimes and rotation by more than 90° upon change of the AC field amplitude is observed.

Słowa kluczowe

Cholesteric liquid crystal grating, chiral ionic liquid, pattern formation, rotatable grating, electro-optical switch

Adres publiczny

http://dx.doi.org/10.1080/02678292.2016.1254825