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Polymer stabilization of cholesteric liquid crystals in the oblique helicoidal state

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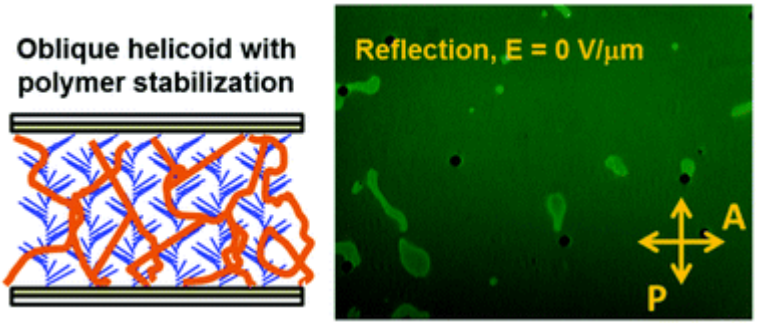
Abstract

Electrical control of the pitch has been reported in a variant of the cholesteric liquid crystal phase composed of chiral dopants and liquid crystal dimers with a bent conformation, such as CB7CB. For a finite range of applied electric field, the dimeric mesogens assume an oblique helicoidal structure, in which the helical axis is aligned along the electric field and the local director is tilted towards the helical axis (rather than being perpendicular to it). An electric field can directly regulate the periodicity (pitch), allowing reconfiguration of the optical response from a scattering or transparent state to a reflective state. Here, we employ po stabilization to retain the oblique helicoidal state absent an applied field. The polymer stabilized oblique helicoidal structures were investigated under various conditions and material compositions. With polymer stabilization, the magnitude of the selective reflection is found to be

dependent on the strength of the applied field. Comparison of the electro-optical response of samples with and without a polymer network elucidates the relative role of boundary conditions, anchoring strength, and elastic energy on the stability of the oblique helicoidal state.



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