

Short pitch cholesteric electro-optical device based on periodic polymer micro-channels.

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Because of its fast electro-optical response, the chiral-flexo-electro-optic effect¹ is potentially very interesting for display industry. The main drawback in the exploitation of this effect is that it relies on a texture, the Uniform Laying Helix (ULH), which is intrinsically unstable when the cholesteric is sandwiched between spatially uniform aligning surfaces.

We present a method, based on the use of periodic polymeric micro-channels, to create highly ordered and stable ULH structures (see fig.1). We show that the periodic structure, which is created holographically, naturally aligns the cholesteric helical superstructure along the micro-channels, without requiring any elaborated ad-hoc procedure, even when the size Λ of the micro-channels is much larger than the pitch P ($\Lambda > 20P$). The electro-optic measurements performed on the device show a very large contrast ratio (>1000), fast flexo-electric response (200 μ s) and large optical rotation ($>30^\circ$).

References (ACS format)

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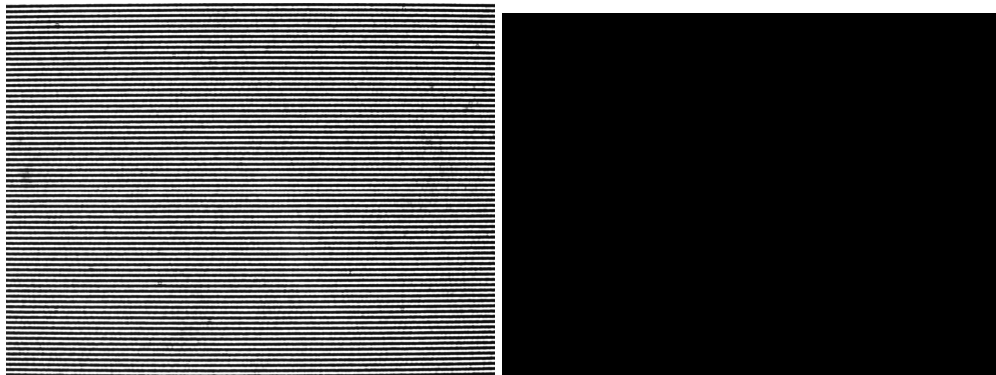


Figure1: Cholesteric filled Periodic polymeric micro-channels, observed with a polarized microscope. The optical axis oriented (a) 45° and (b) 0° with respect to the polarizer.