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Electrooptic Properties of Holographic Polymer-Stabilized Cholesteric Liquid Crystals ERIC BECKEL, MELISSA INGRAM, Air Force Research Laboratory, LALGUDI NATARAJAN, VINCENT TONDIGLIA, RICHARD SUTHERLAND, Science Applications International Corporation, TIMOTHY BUNNING, Air Force Research Laboratory — Cholesteric liquid crystals (CLCs) have attracted significant attention for uses in photonic and electrooptic devices, such as photonic crystals, light switches, and display applications. These materials selectively reflect circularly polarized light due to the existence of a macroscopic helical structure. Application of an electric field reorients the LC from a planar geometry to a homeotropic alignment, eliminating the reflection notch. This LC reorientation to the clear state is rapid with the application of an electric field. After the electric field is removed, the return to the cholesteric orientation is compounded by the long lifetime of a highly scattering focal conic state. To avoid this undesired prolonged focal conic lifetime, a small concentration of monomer can be polymerized, which acts as a memory for the rapid return into the cholesteric state. In this research, we examine the effect of holographically patterning the polymer stabilization. Reflection grating patterning is studied and varying bilayer spacings are examined. This research shows the possibility of minimal notch broadening, with no apparent chirp in the reflection notch. Additionally, we examine the possibility of incorporating a narrow notch Bragg reflection at a differing wavelength than the CLC broad reflection notch, within the same device.

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