

Accepted Manuscript

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PII: S0167-7322(17)33867-9
DOI: doi:[10.1016/j.molliq.2018.02.054](https://doi.org/10.1016/j.molliq.2018.02.054)
Reference: MOLLIQ 8696
To appear in: *Journal of Molecular Liquids*
Received date: 23 August 2017
Revised date: 26 October 2017
Accepted date: 12 February 2018

Please cite this article as: Hossein Nemati, Shiyi Liu, Alireza Moheghi, Vincent P. Tondiglia, Kyung Min Lee, Timothy J. Bunning, Deng-Ke Yang , Enhanced reflection band broadening in polymer stabilized cholesteric liquid crystals with negative dielectric anisotropy. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:[10.1016/j.molliq.2018.02.054](https://doi.org/10.1016/j.molliq.2018.02.054)

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Enhanced Reflection Band Broadening in Polymer Stabilized Cholesteric Liquid Crystals with Negative Dielectric Anisotropy

Hossein Nemati¹, Shiyi Liu¹, Alireza Moheghi, Vincent P. Tondiglia^{2,3}, Kyung Min Lee^{2,4}, Timothy J Bunning² and Deng-Ke Yang^{1,*}

¹ *Chemical Physics Interdisciplinary Program, Liquid Crystal Institute, Kent State University, Kent, Ohio 44242, USA*

² *Air Force Research Laboratory Materials and Manufacturing Directorate, Wright Patterson Air Force Base, Ohio, 45433, USA*

³ *Leidos, 3745 Pentagon Blvd, Dayton, Ohio 45431, USA*

⁴ *Azimuth Corp., 4134 Linden Ave, Dayton, OH 45432, USA*

Abstract

The photonic band gap of cholesteric liquid crystal with negative dielectric anisotropies can be broadened under DC electric voltages by polymer stabilization. The broadening is produced by the movement and aligning effect of the dispersed “structural” chiral polymer network. We carried out a systematic study of factors, such as the alignment layer, moisture and ionic additives, which affect the broadening. Our experimental results show that the degree of broadening is strongly dependent on the ion concentration in the polymer stabilized cholesteric liquid crystal. We observed a linear relation between the broadening and the ion density. By using the optimal material formulation, we achieve 3 folds broadening to cover the entire visible light region with low voltages.

*Author for correspondence

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