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Three-Dimensional Modeling of Holographic Polymer-Dispersed Liquid Crystal Formation via Various Interference Techniques[1] THEIN KYU, GREGORY YANDEK, SCOTT MENG, The University of Akron — Holographic polymer-dispersed crystalline materials (H-PDLC), useful in many optical applications, maintain periodic alignment of liquid crystalline (LC) domains in polymeric hosts. H-PDLC fabrication entails the exposure of a mixture containing monomer, photo-initiator, and inert LC to geometrically arranged light beams where constructive and destructive interference occurs within the sample. Polymerization dominates in regions of high beam intensity such that LC migrates to areas of low intensity resulting in desired periodic structures. It is advantageous to acquire information regarding the physics of the fabrication process through modeling techniques. By coupling reaction-diffusion equations with the Flory-Huggins theory of mixing, Maier-Saupe relations for nematic ordering, and network elasticity terms, modeling has elucidated information without accruing the costs of trial and error. Results predict that a 35% LC volume content and flexible polymer host materials afford optimal structures. Two- and three-dimensional variations in structures have been predicted.

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Thein Kyu
The University of Akron

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