Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Control of Anchoring of Nematic Fluids at Polymer Interfaces and Switchable Diffraction Devices JIAN ZHOU, DAVID COLLARD, JUNG PARK, MOHAN SRINIVASARAO, Georgia Institute of Technology, Atlanta, GA 30332 — In-situ photopolymerization of alkyl acrylate monomers in the presence of a nematic liquid crystal (NLC) provides a cellular matrix of liquid crystalline droplets in which the chemical structure of the encapsulating polymer exerts control over surface anchoring of the NLC. Control can be obtained by variation of the alkyl side chains and through copolymerization of two dissimilar monofunctional acrylates. Copolymerization of two monofunctional acrylates with opposing tendencies of aligning liquid crystal leads to tunability of anchoring behavior over a wide temperature range. We have demonstrated a new electrically switchable diffraction grating based on periodically patterning the anchoring conditions of a nematic fluid within a polymer matrix via a patterned photopolymerization. We used two comonomers with opposite tendency to align the NLC and different reactivity ratio in the copolymerization, which lead to definition of the areas with alternating homeotropic and planar alignment of the NLC through a UV irradiation with a photomask. The photopolymerization-induced diffusion of the monomers accounts for the spatial concentration distribution of these monomers.

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Date submitted: 01 Dec 2004 Electronic form version 1.4