Abstract Submitted
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A novel twisted nematic alignment and its effects on the electro-optical dynamics of nanoscale liquid crystalline films BRITTANY RAUZAN, LAY MIN LEE, RALPH NUZZO, Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL 61801 — Vibrational spectroscopic studies of a surface induced, twisted alignment of the nematic liquid crystal, 4-n-pentyl-4'-cyanobiphenyl (5CB) and its temperature-dependent electro-optical (EO) dynamics were studied near the crystalline-nematic and nematic-isotropic transition temperatures, and at a median temperature in the nematic phase. A 50 nm thick film of 5CB was confined in nanocavities defined by the dimensions of a gold interdigitated electrode array patterned on a unidirectionally polished ZnSe substrate. The film was assembled between two polished substrates bearing extended nanometer-scaled grooves that are oriented orthogonally to one another. The results show that with this anchoring scheme, the molecular director of the LC film undergoes a ninety-degree twist. Step-scan time resolved spectroscopy (TRS) measurements were made to determine the rate constants for the temperature-dependent EO dynamics of both the electric field-induced orientation and thermal relaxation processes of the LC film. The work rationalizes the impacts of organizational anisotropy and illustrates how it can be exploited as a design principle to effectively influence the electric field-induced dynamics of LC systems.

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