

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Effect of Polarization on the Interactions of SmC* Islands on Freely-Suspended Films¹ CHEOL PARK , APICHART PATTANAPORKKRATANA, JOSEPH MACLENNAN , NOEL CLARK, Department of Physics and Liquid Crystal Materials Research Center, University of Colorado, Boulder, CO 80309, U.S.A — We generate islands, circular regions of greater thickness than the surrounding film area, on freely-suspended SmC* films by applying air jets to the film. The *c*-director field (the projection of the molecular long axis onto the plane of the film) is strongly tangential at the edges of the islands, leading to the formation of $s = +1$ topological defects inside the islands and $s = -1$ defects nearby on the background film. Islands interact via these topological defects, with a short-range repulsion and a long-range dipolar attraction governing their stability and leading to their organization in chain-like structures with an equilibrium island separation. We use optical tweezers to measure the force between a pair of islands as a function of their separation. As we vary the enantiomeric excess and hence the polarization of the liquid crystal, the force scales as the polarization squared and the shape of the force curve changes. Simulations based on a simple model of film elasticity and polarization explain our experimental results fairly well.

¹This work was supported by NASA Grant NAG-NNC04GA50G and NSF MRSEC Grant No. DMR 0213918.

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Date submitted: 30 Nov 2006

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