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Polarization elasticity in a ferroelectric smectic liquid crystal film
CHENHUI ZHU, ALS, Lawrence Berkeley National Lab; LCMRC, University of Colorado, APICHART PATTANAPORKRATANA, JOSEPH MACLENNAN, DARREN LINK, JINZHONG PANG, NOEL CLARK, Liquid Crystal Materials Research Center, University of Colorado — Topological +1 and -1 point defects were induced in freely suspended smectic-C crystal films by quickly bending the film by air pressure so that the film momentarily enters SmA phase and relaxes back to the SmC phase. The symmetry breaking in this process spontaneously generates many pairs of topological point defects in the film. We report that the molecular organization of -1 defects is drastically different in high polarization smectic-C films from that in achiral or racemic smectic-C films. Such -1 defect structure can be tuned by ion concentration in the materials, and the enantiomeric excess in the mixture of left-hand and right hand chiral smectic-C. This novel behavior can be understood by considering both an effective increase in Frank elastic constants due to polarization splay and the electrostatic interaction between spatial charges generated by polarization splay which is geometrically enforced in -1 defect. Results on the annihilation of +1 and -1 defect pairs will also be presented. Funding provided by MRSEC Grant No. NSF DMR 0820579. DMR 0820579

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