

Abstract Submitted
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A Biaxial Banana Liquid Crystal Phase with Short-range Layer Ordering¹ YONGQIANG SHEN, TAO GONG, DONG CHEN, RENFAN SHAO, CHENHUI ZHU, MATTHEW GLASER, JOSEPH MACLENNAN, DAVID WALBA, NOEL CLARK, Liquid Crystal Materials Research Center, University of Colorado at Boulder — W623, a single-tail, bent-core molecule with a polar termination on one end and a siloxane-terminated tail on the other, exhibits a ferroelectric, orthorhombic, fluid smectic liquid crystal phase, the SmAP_F. Powder x-ray diffraction (XRD) measurements reveal an exotic structural transition on cooling from the SmAP_F to a SmX phase, in which resolution-limited fluid smectic layering reflections give way to four much broader peaks, indicating short-range layer ordering. This behavior points to the kind of internal frustration that gives rise to our recently discovered helical nanofilament phases. We have performed two-dimensional XRD on aligned samples and discovered that one of the four peaks is from the in-plane order. Freeze-fracture transmission electron microscope (FFTEM) measurements confirm that there is two-dimensional short-range order in the SmX phase, with one periodicity in the layer plane and another normal to the layers. The in-plane periodicity can be measured directly from the packing of fibrils to be about 8 nm, consistent with the in-plane x-ray reflection peak. We will present depolarized transmission light microscopy, high-resolution XRD, and FFTEM studies of pure W623, and of mixtures of W623 with the calamitic liquid crystal 8CB.

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