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Randomized Grain Boundary Liquid Crystal Phase D. CHEN, University of Colorado at Boulder, H. WANG, M. LI, Jilin University, M. GLASER, J. MACLENNAN, N. CLARK, University of Colorado at Boulder, UNIVERSITY OF COLORADO AT BOULDER TEAM, JILIN UNIVERSITY TEAM — The formation of macroscopic, chiral domains, in the B4 and dark conglomerate phases, for example, is a feature of bent-core liquid crystals resulting from the interplay of chirality, molecular bend and molecular tilt. We report a new, chiral phase observed in a hockey stick-like liquid crystal molecule. This phase appears below a smectic A phase and cools to a crystal phase. TEM images of the free surface of the chiral phase show hundreds of randomly oriented smectic blocks several hundred nanometers in size, similar to those seen in the twist grain boundary (TGB) phase. However, in contrast to the TGB phase, these blocks are randomly oriented. The characteristic defects in this phase are revealed by freeze-fracture TEM images. We will show how these defects mediate the randomized orientation and discuss the intrinsic mechanism driving the formation of this phase. This work is supported by NSF MRSEC Grant DMR0820579 and NSF Grant DMR0606528.

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