Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Slow Phase Separation in Mixed Columnar Phases of NanoDNA and Chromonic Dye[1] GREGORY SMITH, YOUNGWOO YI, DAVID WALBA, NOEL CLARK, Liquid Crystal Materials Research Center, University of Colorado, Boulder (CO) U.S.A. — The architecture of a DNA duplex with its externally exposed charged phosphate backbone and internally hidden aromatic bases, hydrophobically stacked at a spacing of 3.4 Å, is strikingly similar to aggregates of Liquid Crystal (LC) forming chromonic dyes such as Sunset Yellow (SSY). One might naturally question whether a DNA-like molecular column can be assembled from a subunit resembling a chromonic dye. Because little is known about direct mixtures of chromonics with DNA and how such a mixture might form mixed LC phases, we mixed blunt-end 12mer NanoDNA (GCGCTTAAGCGC) with SSY, both of these molecular species independently having well-described LC behavior. Observed mixtures are remarkably miscible, exhibiting a mixed chiral nematic phase with Grandjean texture that is distinct from SSY and DNA nematic forms. On transition to the columnar phase when the molecular species fractions are very close in proportion (about 1:1.3 DNA:SSY by weight) the columnar phase exhibits a slow but thermally reversible demixing to produce a striated texture whose assembly is guided by the columnar director structure.

[1]Grant support: NSF DRM 1207606 and NSF MRSEC DRM 0820579

Gregory Smith
Liquid Crystal Materials Research Center,
University of Colorado, Boulder (CO) U.S.A.

Date submitted: 15 Nov 2013 Electronic form version 1.4