

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Single-stranded DNA induced chirality and helical twist in achiral liquid crystals RAJRATAN BASU, US Naval Academy — A small quantity of single-stranded DNA (Deoxyribonucleic acid–cellulose single-stranded from calf thymus DNA in lyophilized powder form) was doped in an achiral liquid crystal (LC), and the mixture was found to exhibit a weak degree of chirality. The induced chirality in the LC was probed by means of the electroclinic effect in the LC's smectic-*A* phase, which showed significant pretransitional behavior on approaching the smectic-*A*–smectic-*C* transition temperature from above. The same DNA was doped in an achiral nematic LC and the mixture was found to exhibit an average mechanical twist over macroscopic dimensions. The single-stranded DNA-induced chiral pitch length P was determined by measuring the radius of curvature of reverse twist disclination lines in 90° nematic twist cells. In the LC+DNA mixture, the LC's benzene rings interact with the nucleobases of the DNA through $\pi - \pi$ stacking, which induces a molecular conformational deracemization in the LC.

Rajratan Basu
US Naval Academy

Date submitted: 14 Nov 2014

Electronic form version 1.4