

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

End-to-End Adhesion of Short Duplex DNA Oligomers TOMMASO BELLINI, University of Milano, Italy, NOEL CLARK, University of Colorado — The classic model for the formation of liquid crystal phases of rod shaped objects was presented by Onsager, who showed that hard rods of length L and diameter D form a nematic phase when volume fraction is $f > f_c = 4D/L$. This criterion is obeyed reasonably well for rod-shaped nucleosomal [150 base pair (bp)] B-DNA duplexes ($L = 50\text{nm}$, $D = 2\text{nm}$). Recently we found, however, that very short duplex B-DNA oligomers, 6bp – 20bp (2 to 6nm) in length, form similar nematic and columnar LC phases, even though their L/D ratio is almost 1 and $f \ll f_c$. We attribute these phases to intermolecular interaction which provides an end-to-end adhesion force between these short oligomers to form extended anisotropic “living polymers.” The theory of the formation of such anisotropic aggregates will be reviewed and applied to the DNA observations. Work supported by NSF MRSEC Grant DMR 0213918 and NSF Grant 0072989.

noel clark
university of Colorado

Date submitted: 07 Dec 2005

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