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Condensation of liquid crystals of complementary nDNA duplexes from a solution of mixed oligomers GIULIANO ZANCHETTA, Universit'à di Milano, TOMMASO BELLINI, Università di Milano, MICHI NAKATA, NOEL CLARK, University of Colorado — We have investigated the phase behavior of concentrated mixtures of: (i) the complementary oligonucleotides CCTCAAAACTCC ("oligoA") + GGAGTTTTGAGG ("oligoB") and (ii) the self complementary oligomer CGCGAAAATTTTCGCG ("oligoSelf") with mixed random 20-22bp non-complementary single stranded oligomers ("oligoMix"). We find that upon cooling from above the duplex unbinding temperature, subpicoliter liquid crystal domains of complementary oligomers condense out from the isotropic mixture of non-complementary sequences. This phenomenon is observed in 300-600 mg/ml oligomer solutions and for mixtures with the ratio of complementary/non-complementary sequences down to [oligoA]/[oligoB] = 1/15 and [oligoSelf]/[oligoMix] = 1/5. Comparison of condensated volumes and complementary/non-complementary weight ratios indicates that the segregation is strong, as also suggested by the columnar ordering on the condensed domains. We interpret these findings in terms of depletion forces acting on mixtures of flexible+rigid solutes. The spontaneous condensation of well paired sequences into microdroplets where the duplexes face each other at their endings opens new possibilities to prebiotic scenarios for the formation of biopolymers. Work was supported by NSF Grant DMR 0606528 and NSF MRSEC Grant No. DMR 0213918.

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