Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Self-organized Gels in DNA/F-Actin mixtures without Crosslinkers JOHN BUTLER, GHEE HWEE LAI, OLENA ZRIBI, University of Illinois at Urbana-Champaign, IVAN SMALYUKH, University of Colorado at Boulder, THOMAS ANGELINI, Havard University, KIRSTIN PURDY, University of Illinois at Urbana-Champaign, RAMIN GOLESTANIAN, University of Sheffield, GERARD C. L. WONG, University of Illinois at Urbana-Champaign — Interactions between flexible chains and rigid rods govern a broad range of soft matter systems. As a model system of like-charged rigid rods and flexible chains, we examine mixtures of DNA and filamentous actin (F-actin). Confocal microscopy reveals the formation of elongated nematic F-actin domains reticulated via defect-free vertices into a network embedded in a mesh of random DNA. Synchrotron small-angle x-ray scattering (SAXS) indicates that the DNA mesh squeezes the F-actin domains into a nematic state with an inter-actin spacing that decreases with increasing DNA concentration. Salt strongly influences the domain sizes and transitions the system from a counterion-controlled regime to a depletion-controlled regime, both mechanisms of which are entropic in origin.

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Date submitted: 21 Nov 2008 Electronic form version 1.4