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DNA electrophoresis in tri-block copolymer gels—experiments and Brownian dynamics simulation LING WEI, DAVID H. VAN WINKLE, Department of Physics, Florida State University — The mobility of double-stranded DNA ladders in Pluronics®P105, P123 and F127, was measured by two-dimensional gel electrophoresis. Pluronics®are triblock copolymers which form gel-like phases of micelles arranged with cubic order at room temperature. A 10 base pair and a 25 base pair DNA ladder were used as samples in gel electrophoresis. The monotonically decreasing mobility with increasing length observed in the agarose separations is not observed in separations in Pluronics®. Rather, a complicated dependence of mobility on DNA length is observed, where mobility vs. length increases for short DNA molecules then decreases for longer molecules. There is also a variation of mobility with length correlated to the micelle diameter. Brownian dynamics simulations of a discrete wormlike chain model were performed to simulate short DNA molecules migrating in free solution and in a face-centered cubic matrix. By incorporating hydrodynamic interactions, the trend of simulated length-dependent mobility qualitatively agrees with experimental measurements.

Ling Wei
Department of Physics, Florida State University

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