

604d Electric Field Manipulation of Charged Cylindrical Block Copolymer Micelles

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Giant wormlike micelles formed in water from poly(acrylic acid) (PAA), polybutadiene (PBD) diblock copolymers, are easily manipulated in solution by an applied external electric field. Worms are imaged under fluorescence microscopy in a novel experimental chamber. The setup allows for application of external electric field, and confinement of worms in quasi 2 dimensions, simultaneously. Stretching, tumbling and alignment of worms along field direction is observed when a low frequency (0.5 Hz) oscillating electric field is applied. Stiffening of the worm backbone is observed at high frequencies (> 15 Hz). This stiffening can be quantified as an increase in persistence length of the worm. A phase diagram of the center of mass displacement amplitude of the worms as a function of applied field, frequency of oscillation, and length of worms, is being attempted. Manipulating individual worm micelles using an electric field provides insights into the dynamical time scales of the worms. Motion of charged, branched micelles in an electric field is also being studied. Possibility of obtaining translatory motion perpendicular to the direction of applied field is being examined.