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Electrophoresis of composite objects: effect of shape, topology and polymer stiffness MYKYTA V. CHUBYNSKY, GARY W. SLATER, Department of Physics, University of Ottawa, Canada — In several methods of electrophoretic separation, DNA fragments are conjugated or form complexes with objects of various kinds (linear and branched polymers, globular proteins, gold nanoparticles, micelles) having a different electrophoretic mobility. With these applications in mind, we study the free-solution electrophoresis of various composite objects (diblock copolymers with blocks of different stiffnesses, a polymer attached to a sphere, a branched polymer). We use the approach of Long *et al.* [J. Chem. Phys. 108 (1998) 1234], calculating hydrodynamic interactions within the Kirkwood-Riseman approximation, and we extend the approach to the case where some parts are solid objects, rather than polymers. We find, in particular, that for diblock copolymers the results depend strongly on the relative stiffness of the blocks. If the mobility of the complex is represented as a weighted average of the mobilities of the individual parts, then when a polymer is attached to a sphere or forms a branch the weights are lower for the parts near the attachment point.

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