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Watching Nanoparticles Move through Polymers JUAN GUAN, BO WANG, STEPHEN ANTHONY, SUNG CHUL BAE, STEVE GRANICK, U of Illinois - Urbana - Champaign — Several recent experiments show that the Stokes-Einstein equation used to describe particle diffusion is violated when nanoparticles are surrounded by polymer chains. In some systems, particles move faster; in others, more slowly, depending on the size of the probe. It is generally agreed that the relative timescale for a polymer chain to relax and a nanoparticle to diffuse the size of a polymer chain are what matter. In this work, we embed fluorescently-labeled nanoparticles within polymer solutions and use single-particle tracking to understand the relative motions of the two. A unique aspect is that we track motions not just of the nanoparticles but also those of the polymer chains in which they are embedded. The worst-case resolution of 30 nm in nanoparticle relative position is improved when slow motions improve the signal-to-noise.

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