Abstract Submitted
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Triaxial AFM Contact-Free Tweezers[1] KEITH A. BROWN, R.M. WESTERVELT, Harvard School of Engineering and Applied Science — We present a triaxial atomic force microscope contact-free tweezer (TACT) capable of controlled assembly of nanoparticles suspended in a liquid[1]. The TACT uses negative dielectrophoresis to trap a single nanoparticle at the tip of an AFM so it can be positioned on a substrate. The "sticky finger" problem of irreversible adhesion to any surface is overcome by holding the nanoparticle away from the tip in the zero of an electric field created by the electrodes at the tip. The trap is size-matched to the nanoparticle to ensure that only one nanoparticle is held at a time. We present initial experiments and simulations that explore the potential of the TACT. Analysis of the model system of a silicon semiconductor nanoparticle suspended in water shows that single nanoparticle trapping and placement is possible. We propose methods to use the TACT for the controlled assembly of single semiconductor quantum dots, semiconductor nanowires, carbon nanotubes, and biological molecules.

[1] K.A. Brown and R.M. Westervelt, Nanotechnology **20**, 385302 (2009).

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