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Electrophoresis of Ferroelectric Nanoparticles XIYA LIU, DRAGOMIR DAVIDOVIC, SCHOOL OF PHYSICS,GEORGIA TECH TEAM —
We have studied the electrophoresis of ferroelectric nanoparticles(Ba1-xSrxTiO3). We used de-ionized (DI) water as solvent and an optical microscope to observe the motion of suspended ferroelectric nanoparticles driven by AC electric fields. The immediate start and stop of motion were noticed when the driving electric field was turned on and off, which was similar to dielectricphoresis. Higher voltage generated higher speed as expected. In some instances, the dielectric constant ε of ferroelectric materials can increase greatly, which makes it possible that a low driving voltage (no larger than 10V) could induce a relatively high speed. At room temperature, we studied the frequency dependence of the motion speed. By comparing a serial of captured motion movies, we found that higher speeds were corresponding to lower frequencies of driving AC electric field. Further, we use well defined electrodes made by electron-beam lithography and high-vacuum deposition, which may regulate the electric field distribution. Consequently, we can characterize the electric force applied on those nanoparticles.

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