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DEP Force Spectroscopy JINGYU WANG, STEVEN M.T. WEI, JOSEPH JUNIO, H.D. OU-YANG, Lehigh University — We report measurement of the frequency-dependent dielectrophoretic forces imparted on individual colloid particles in an aqueous suspension. The motion of suspended particles relative to the solvent resulting from polarization forces due to an inhomogeneous electric field is known as the dielectrophoretic force (DEP). In the case of colloidal particles, the Claussius-Mossotti (CM) function containing the frequency dependence of the dielectric behavior of the particle relative to the suspending fluid dictates the direction and magnitude of the resulting DEP force. The magnitude of this force approaches zero as the frequency approaches the point of cross-over to switch the direction of the force. Using optical tweezers as force sensor we have successfully characterized the frequency dependent DEP force with a spatial resolution in the micron range and a force resolution of a fraction of 1pN. To achieve this, we used an AM modulation scheme to administer the oscillating electric field, so that we could monitor the phase and amplitude of the displacement of the particle while it was held by the optical tweezers and acted on by the DEP force. The optical tweezers based DEP force spectroscopy presents a way to understand the fundamental parameters at the microscopic level.

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