

Abstract Submitted
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Two-dimensional mapping of dielectrophoresis force and AC electro-osmosis flow JINGYU WANG, H.D. OU-YANG, Lehigh University — In an AC electric field, colloids in an aqueous suspension are subjected to different electrokinetic forces. Charged particles will experience a frequency dependent dielectrophoresis (DEP) force due to the polarizability response of the associated double layers, causing particle movement. At the cross-over frequency when the double layers cannot fully respond to the field, this force tends to zero. For free ions in solution, Coulomb forces exerted on them near the electrodes can produce fluid flows through AC-electro-osmosis (ACEO). As DEP and ACEO depend quadratically on the field strength, it is difficult to distinguish the contribution of each force exerted on a particle. To differentiate DEP and ACEO, we used optical tweezers to track individual particle motion to pin-point the DEP cross-over frequencies at locations where ACEO is negligible. We then mapped out the ACEO flow patterns at the cross-over frequency of zero DEP force. Moreover, as the cross-over frequency was a function of particle size, we were able to determine the scaling of the ACEO flow with the applied field frequency.

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