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Dielectrophoresis of Functional Phospholipid Vesicles VICTORIA FROUDE, YINGXI ELAINE ZHU, University of Notre Dame — Recently, there has been an emerging interest in using AC-dielectrophoresis (DEP) to transport and assemble phospholipid vesicles (liposomes) and nanoparticles to form functional bio-assemblies where the underlying charge polarization mechanism of colloids in AC fields strongly depends on nano-scaled surface charge. In this work, we study liposomes segregation and aggregation in the presence of nanocolloids and salts in which the biological functionality of liposomes is augmented by the physical functionality of inorganic coating and particles. Liposomes, synthesized by sonication with 1,2-Dioleoyl-sn-Glycero-3-Phosphate (DOPA), are manipulated at varied AC-field frequencies across fabricated micro-electrodes in a quadrapole configuration on glass. We observe the co-assembly of liposome and opposite-charged nanocolloids by confocal microscopy and SEM, where the smaller nanocolloids are captured in between liposome junctions to form stabilized composite vesicles at several distinct frequencies. We observe a strong dependence of the liposome DEP mobility on the number of nanoparticles present in suspension and propose a new mechanism based on charge segregation and charged nanocolloid entrainment in the double layer.

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