

Abstract Submitted  
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**The effect of time-scales on the liquid meniscus during AC electro-spraying.** SIDDHARTH MAHESHWARI, HSUEH-CHIA CHANG, University of Notre Dame — Electro-spraying under an AC electric field displays different spray modes. The liquid meniscus exhibits resonance, multi-cone spraying, dripping, tip-streaming, jetting, steady conical shapes or discharge assisted ejections at certain voltage-frequency-conductivity-viscosity windows. The dramatic variation in the meniscus behavior suggests interplay of different charging mechanisms taking place both in the liquid and gas phases. The observation of quasi-steady cones exhibiting growth in the longitudinal dimension point to charge entrainment in the liquid phase causing charge accumulation over successive half cycles leading to the meniscus growth. The effect of liquid conductivity on the occurrence of these cones reflects the role of charge relaxation time scale which must be significantly larger than the period of the applied field. On the other hand, the gas phase charging behavior is seen in the observation of corona discharge induced glow and the consequent ejection event. The coupling of these charging behaviors hence gives rise to various spraying modes suggesting a simple method to produce droplets with specific dimensions for different liquids.

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