

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Theoretical and experimental study of meniscus behavior under AC electric field for Electrohydrodynamic (EHD) jetting SI BUI QUANG TRAN, DOYOUNG BYUN, Konkuk University, Seoul, Korea — The electrohydrodynamic (EHD) spraying technique has been utilized in applications such as inkjet printing and mass spectrometry technologies. In this paper, the role of electrical potential signals in jetting and on the oscillation of the meniscus is evaluated. The jetting and meniscus oscillation behavior are experimentally investigated under ac voltage, ac voltage superimposed on dc voltage, and pulsed dc voltage. Furthermore, the analytical simulation about the oscillation of an anchored edge hemispherical meniscus located on a conductive flat plate under a uniform ac electric field is presented. The mutual interaction between the electric field and the hydrodynamics is iteratively solved. As a result, the simulation can calculate the meniscus shapes, contours of voltage outside the meniscus and the velocity profile of liquid inside the meniscus during the period of the oscillation according to the applied frequency. Based on the present theory, one can predict the oscillation mode with a certain applied frequency. The present theory can also be applied to investigate the oscillation of a free conductive drop in a uniform ac electric field.

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Date submitted: 06 Aug 2009

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