MINIMUM FLOW RATE IN ELECTRO-COFLOW

Benjamin Overlie and Josefa Guerrero-Millan

Citation
Minimum Flow Rate in Electro-Coflow

**Presenter:** Benjamin Overlie (Oral Presentation)

**Authors:** Benjamin Overlie and Josefa Guerrero-Millan

**Faculty Sponsor(s):** Josefa Guerrero-Millan, PhD

**Department Affiliation:** Chemistry and Physics

**Funding:** ACS Petroleum Research Fund (60302-UR9)

**ABSTRACT**

Controlled generation of micron and sub-micron sized drops continues to be of strong interest for the scientific community due to the variety of applications in many different fields. Emulsion drops can be generated by flowing two immiscible liquids inside a glass-based microfluidic device. Their minimum size will be of the order of the tip size. To create smaller drops, an external electric field can be used, similarly to what it is done in the classical electrospray. In electrospray, a liquid is issued into the air from an electrified needle. When the flow rate of the liquid is controlled, there is a minimum flow rate below which a cone-jet cannot be formed regardless of the applied voltage. This minimum flow rate provides the minimum drop size that can be generated, usually one or two orders of magnitude smaller than the tip size. In this presentation, we explore this lower limit in electro-coflow using pressure control instead, which generates different results from using electrospray, and with a more complex behavior. The use of pressure control, and the presence of an outer moving fluid, enrich the dynamics in the minimum flow rate limit.

*Received: 01/31/2020  Accepted: 02/17/2020*

*Correspondence:* Benjamin Overlie, Augusta University, 1120 15th St. Augusta, GA 30912, boverlie@augusta.edu