Modeling And Simulation Of Taylor Cone And Jetting From Liquid Droplets

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Abstract

Liquid droplets are deformed when subjected to an electric field and acquire stable conical shape with a half angle of 49.3 degrees which is well known by "Taylor cone". The conical shape is a result of force balance between surface tension force, viscous force and electrostatic force. This phenomenon is widely studied and is strongly related to the electrospinning process which is recognized as an efficient technique to produce nanofibers. Multiphysics numerical simulation using COMSOL Multiphysics® was performed to describe fluid behavior in the presence of external electric field. CDF and AC/DC modules were used in COMSOL simulation. Three materials were used in this simulation; glycerol, water and NaCl solution. Taylor cone formation and jetting were correctly described by simulation when compared with experimental work in the literature. Effect of polarity and needle diameter on jetting has also been investigated

Figures used in the abstract

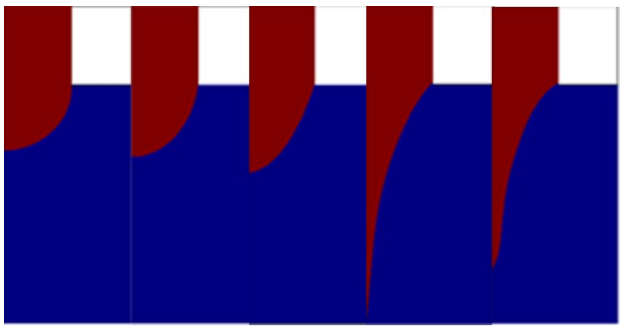

Figure 1 : Glycerol Jetting Stages Under Different Voltages