

Abstract Submitted
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Oscillatory jet flow in electrospinning of polymer nanofibers¹

SUREEPORN TRIPATANASUWAN, Department of Polymer Science, The University of Akron, DARRELL RENEKER, Department of Polymer Science, The University of Akron — The flow of polymer solution into an electrospinning jet can be controlled by the pressure applied to the fluid, and the flow out can be controlled by the electrical potential of the fluid. When the average flow rate of solution carried away by the jet was smaller than the rate at which the liquid was forced through the orifice into the jet, the solution flow rate and the electrical current both oscillated in time. The amount of fluid near the orifice grew larger and caused the flow out of that region to increase, and the amount of fluid near the orifice decreased. Then the cycle repeated. The oscillatory phenomena were demonstrated using a jet of polyethylene oxide in water (Molecular weight, 400k, concentration about 5%) flowing through a tube with a diameter of 0.7 mm. The pressure was 500 to 2500 Pascals, and the applied potential was around 5 kV. The frequency of oscillation (about 0.5 Hertz) was affected by the resistivity of the polymer solution (around 4500 ohm-meters).

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