

# Process Dynamics and Control Analysis for Electrospinning Nanofibers

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***Abstract***— In many emerging high value electrospinning applications, the diameter distribution of electrospun nanofibers has important implications for the product's performance and process economics. However, the current state-of-the-art electrospinning process results in varying diameter distributions, both during a run and from run-to-run. To address this problem, our research is focused on developing a better understanding of the relation between the process physics and the resulting fiber diameter distribution, as well as developing appropriate control strategies in order to achieve consistent and controllable fiber diameters. In this paper, we present the results from our modeling and experimental investigation into the fundamental process dynamics, and the relation between measurable variables and process parameters to the resulting average fiber diameter. Both needle and free surface electrospinning systems are considered.