

EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Electrohydrodynamic (EHD) printing for high resolution 2D patterning and additive manufacturing

ABSTRACT – Capabilities to produce micro-structures with complex geometry and using a broad set of functional materials are critical for many emerging products. Printing is a scalable and flexible process to work with different functional materials. However, most existing printing approaches are limited in resolution with their best resolution no better than 50-100 µm. This talk will focus on a high resolution printing approach, electrohydrodynamic (EHD) printing, which can integrate multi-materials for advanced micro/nano devices and for super-resolution additive manufacturing. Two printing modes, filament plotting and drop-on-demand printing, are developed for the fabrication of 3D microstructures. We will discuss the process models to study and predict the EHD printing process, including droplet formation from the nozzle and droplet settlement on the substrate, which is very important to predict the feature dimension at different system configurations and process conditions for planning the printing sequences. We will also discuss the solution for a critical challenge in EHD printing that is the residue charge cancellation by our process innovation for printing electronic materials.



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SPEAKER BIO – Dr. Jingyan Dong has been an associate professor in the Department of Industrial and Systems Engineering at the North Carolina State University since fall 2014. Prior to joining the NC State in 2008 as an assistant professor, he was a postdoc at the Center for Nanoscale Chemical-Electrical-Mechanical Manufacturing Systems (Nano-CEMMS) and a Lecturer at the Department of Industrial and Enterprise Systems Engineering at the University of Illinois at Urbana-Champaign. He received his Ph.D. in Mechanical Engineering in 2006 from the University of Illinois at Urbana-Champaign, a M.S. from Chinese Academy of Sciences in 2001, and a B.S. in Automatic control from the University of Science and Technology of China in 1998. Dr. Jingyan Dong is a recipient of SME Outstanding Young Manufacturing Engineer Award, IIE Outstanding Early Career Industrial Engineer in Academia Award, and Outstanding Paper Award from NAMRC. His research interests span multiple topics in the micro and nanoscale manufacturing, including high-speed nanopositioning, miniaturized nanomanufacturing systems, tip-based nanomachining, and high resolution printing.

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3:30PM – 4:50PM

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