



**Wolfson Department of Chemical Engineering Seminar
Lecture Hall 6, Wolfson Department of Chemical Engineering,
Wednesday December 19st at 1:30pm**

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**Thermocapillary and Electrostatic Manipulation of Soft Matter
for Micro/Nanomanufacturing**

Recent developments in nanostructured materials have demonstrated myriad desirable properties ranging from photonic or plasmonic metamaterials to biomanipulative surfaces. To bring these properties from the lab to the commercial space will require innovative nanomanufacturing strategies focused on scalable and cost-effective techniques. My lab, the Hybrid Micro/Nanomanufacturing Laboratory, applies the manipulation of fundamental driving forces to this challenge through combinations of top-down and bottom-up techniques for new hybrid lithographic strategies. In this seminar, I will highlight two such strategies: (1) focused laser spike (FLaSk) excitation for the fabrication of nanoscale patterns through extreme thermal gradients and (2) self-limited electrospray deposition (SLED) of thin films and nanomaterial precursors. In FLaSk, nanoscale polymeric or metallic features are made in a localized region by simultaneously providing both the mobility and driving force for self-assembly. In SLED, specific manipulation of the electrostatic repulsion, hydrodynamic forces, and evaporation kinetics can be employed to conformally cover 3D architectures with hierarchical microcoatings of protective and functional materials. Further, combining these methods enables rapid deposition of templated microstructures. The critical feature of these processes is that they shift the burden of micro/nanoscale resolution from a costly or slow technique to a more scalable method bottom-up method. In this way, barriers to integration with rapid production methods, such as roll-to-roll or spray coating are removed.

Refreshments will be served at 1:15pm