Recent Progress in Solid and Liquid Printing Techniques for Nanofabrication

The physics of electrohydrodynamic flows and of soft adhesion provide foundations for advanced techniques in printing of liquid and solid materials, with unique capabilities in nanofabrication. This talk summarizes results of recent work in these areas, with emphasis on (1) electrohydrodynamic jet (e-jet) printing and (2) transfer printing. The first highlights use of e-jet with solutions of block copolymers, to achieve well-controlled patterns with overall layouts that span dimensions from nanometers (i.e. feature sizes continuously tunable between 13 nm and 20 nm) to centimeters (i.e. wafer scale). The second introduces strategies to three dimensional semiconductor micro/nanostructures, with application examples in multijunction photovoltaics that offer full-spectrum, ultrahigh efficiency operation.