

Some Recent Progress in Soft and Fluidic Based Techniques for Nanomanufacturing

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Presentation

Abstract: Progress in nanoscience and technology relies critically on the ability to build structures with nanometer dimensions. Established tools have their origins in the microelectronics industry and are spectacularly well suited to the applications for which they were principally designed. These methods have drawbacks, however, that limit their use in new fields of study: they require expensive facilities; they have difficulty forming features smaller than ~100 nm; they can pattern directly only narrow classes of specialized polymers; and they can only be applied, in a single step, over relatively small areas on ultraflat substrates. These limitations create opportunities for new methods, ranging from adaptations of conceptually old techniques based on printing, molding and writing, to strategies that rely on bottom-up growth, self-assembly, phase separation and others. This talk describes unconventional approaches to nanomanufacturing, including (1) fluid jet printing techniques, (2) molecular and three dimensional soft lithographic methods and (3) soft transfer printing schemes for heterogeneous materials integration. The underlying scientific principles of these procedures will be discussed, along with representative engineering aspects of application in solid state lighting, flexible electronics and unusual photovoltaic systems.