

Optimization of Energy Devices by Unconventional Lithographies

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Unconventional lithographies, such as soft lithography, nanoimprint lithography, capillary force lithography, have been developed as tools for fabricating sub-100 nm structures or three dimensional features of polymeric materials. The molding techniques also have been employed for the construction of micro- or nanostructures of functional materials, for example, conductive polymers, functional nanoparticles, transparent oxide materials, etc. In this talk, we demonstrate some results to optimize energy devices such as light emitting diodes (LEDs) and photovoltaic cells. First, we present a methodology to transfer quantum dot (QD) nanoparticles by a reusable stamp for QD-LEDs. And we demonstrate nanostructures of conductive polymers in sub-100nm for ordered heterojunction organic photovoltaic cells which is inevitable for large area fabrication. Furthermore, we propose a light harvesting strategy with three dimensional structures of transparent oxide materials to increase the light absorption in the patterned photoanodes of dye sensitized solar cells (DSSCs).