Nanopatterning and Self-Assembly

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Nanoengineering holds vast promise for innovation in every public endeavor and industry from health, energy, electronics and transportation to the environment and national security. The development of nanopatterning techniques including self and directed assembly processing are key for enabling these innovations, which demand the patterning of nanostructures with ever-smaller features in the 1-100 nm range. Alternative approaches to conventional top-down lithography are envisioned to offer advantages in realizing next-generation information processing nanoarchitectures such as cellular, bio-inspired, and crossbar architectures. Bottom-up fabrication of nanodevices via bio-inspired approaches using deoxyribonucleic acid (DNA) oligonucleotides are being explored extensively by researchers which have unique and predictable recognition capabilities as a molecular templates and also important as active elements of selected nanodevices. Besides molecular templates of oligonucleotides, viral templates are also promising for nanoengineering of devices and architectures. Recent progress in this area illustrates the great promise of nanoengineering of functional materials and systems, and indicates new avenues of technology and industry development which will have an impact in our society as the next industrial revolution.

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