

Nanomanufacturing Through Directed Assembly of Nanoelements

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Abstract

Scientific breakthroughs in nano-science have come at a surprisingly rapid rate over the past few years. The transfer of nano-science accomplishments into technology, however, is severely hindered by a lack of understanding of barriers to nanoscale manufacturing. For example, while shrinking dimensions hold the promise of dramatic increases in data storage densities, realistic commercial products cannot be realized without first answering the question of how one can directly assemble and wire billions of nano-scale devices together, or how one can prevent failures and avoid defects. Fundamental understanding and novel technology in high rate, high volume integration and assembly of robust tools and processes are addressed. Nanotemplates and tools are used to accelerate the creation of highly anticipated commercial products and will enable the creation of an entirely new generation of applications. This requires understanding what is essential for a rapid multi-step, high volume/high rate processes, as well as for accelerated-life testing of nanoelements and defect-tolerance.