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# ***Nanoengineering: Fabrication, Properties, Optics, and Devices IX***

**Elizabeth A. Dobisz**  
**Louay A. Eldada**  
*Editors*

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# Introduction

This volume features contributions from scientists and engineers in the general area of nanoengineering. Over the past few years, mature technologies such as logic, memory, and data storage have been rapidly thrust into the sub-100 nm regime. Existing processes of record have been extended well beyond the ranges previously deemed feasible or reliable. New technologies such as advanced renewable energy harvesting systems, energy storage systems, biotechnology and medical nanosystems, 3D sensors, 3D displays, systems on a chip, optofluidics, nanophotonics, and molecular electronics and optics are emerging. Advances in nanoparticles, nanowires, nanotubes, nanoflakes, nanocomposites, and nanocoatings offer attractive novel physical properties with enhanced performance opportunities.

Continuing improvements in the design and fabrication of micro/nano/quantum-scale optical elements have driven the development of both passive and active miniature optical components with ever more diverse applications. New applications include optical communication, neural systems, optical information processing, optical computing, optical storage, optical scanning, optical spectroscopy, smart pixel arrays, information display, imaging, printing, medical diagnosis, and chemical and biological sensing. Emerging nanotechnologies present new opportunities and challenges in materials processing, device design and integration. Commercial drivers include increased functionality, performance, reliability, and reduced size and cost.

These proceedings of the nanoengineering conference include discussions of novel material fabrication and processing, properties of nanostructures, innovative patterning and processing techniques, micro/nano/quantum optics, and fabrication and packaging of miniature devices. The innovations reflected in the papers range from driving existing schemes and processes to new limits to totally novel concepts and designs. Papers from academic and research institutions push the state of the art in miniaturization, level of integration, and performance figures of merit; papers from industry require yield and tolerances as new design criteria, and nanofabrication manufacturing methods are exploited to make commercially deployed products.

Although this volume cannot include all the recent important work in the vast field of nanoengineering, it does cover a significant cross-section of the advances happening globally in areas where nanoengineering is making an

impact. We hope these papers by world-renown experts serve the purpose of bringing the readers up to date on the state of the art in this fast-growing and exciting field.

**Elizabeth A. Dobisz**  
**Louay A. Eldada**