

## **Emerging Research Materials and Nanofabrication Methods: Challenges and Opportunities**

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### ***Presentation***

**Abstract:** Today's perception that manufacturing costs and percent device variability will increase exponentially with scaling and functional diversification is pervasive. Projected requirements, such as line edge roughness, long range dimensional and positional control, resolution, throughput, dopant variability, pattern matching, and functional density, increasingly challenge our ability to achieve reliable system performance. Extensible fabrication options are needed that enable: Sustainable, centered, low-variability fabrication technologies; new cost curves for nanoelectronics fabrication; and enhanced system value through integrated functional diversification. An optimal manufacturing strategy will reflect the convergence between application and design specific requirements and a synergistic set of material and assembly options. This talk will consider emerging research material and nanofabrication opportunities that exhibit potential for satisfying projected International Technology Roadmap for Semiconductor (ITRS) requirements and enable extensible nanofabrication. It will include an update on the need for and status of ITRS Emerging Research Materials, such as smart resists, self assembling systems, and environmentally benign, high performance materials and processes. This talk also will explore emerging opportunities in functional diversification, which exhibits potential for enabling enhanced functional density on a CMOS platform, and provide a brief overview of Semiconductor Research Corporation.