

Future Nanomanufacturing Considerations: Cycles and Security

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Abstract: Twenty years ago, many semiconductor companies embraced the notion of a technology hierarchy that guided funding priorities. For example, at that time, materials research resided at the bottom of the nanoelectronics technology ladder, followed by manufacturing, devices, circuits, systems, and architecture. Architectures represented the highest perceived value-added area of investment. Based on this guiding principle, in the early two-thousands, we saw strategic shifts in company focus that sequentially moved investments up this ladder. By 2020, much of domestic nanomanufacturing moved offshore, away from integrated nanomanufacturing and towards a more foundry centric model. Additionally, industry consolidation continued. What happens when any industry reaches the top of its nanotechnology ladder? Part I of this presentation considers the risks and benefits of several options that anticipate and warrant consideration in the emerging twenty-first century nanomanufacturing technology landscape.

More recently, the security of a given nanomanufacturing technology and its corresponding products has emerged as a high impact global challenge. How can we ensure and assess whether a nano-manufactured product satisfies intended specifications and arrives with the expected product integrity, free of tampering, and without adverse hardware modifications? Addressing this concern is especially challenging for delocalized nanomanufacturing environments that include harsh processing conditions. Part II of this presentation raises awareness of nanomanufacturing related security issues and some potential solutions for research consideration.