

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.

Bio: Dr. Herr serves as professor and founding Chair of the UNC Greensboro's Nanoscience department in the Joint School of Nanoscience and Engineering (JSNN). His collaborative and transdisciplinary team that explores strategic, convergent, and high impact opportunities that will benefit society. Current research interests include kinetics of functional nanomaterial growth, biomimetic self-assembly, and sustainable food security. Prior to joining the UNC Greensboro, Dr. Herr served as Semiconductor Research Corporation's Director of Nanomanufacturing Sciences and a contributing member of the SRC team that won the 2005 National Medal of technology. He is credited with authoring/co-authoring twenty-nine inventions; fifty-four articles and eleven books; and more than two-hundred eighty invited talks and media presentations. Professor Herr serves as Fellow of the International Society for Optics and Photonics (SPIE), North American Regional Editor for the Springer/Nature Journal of Nanoparticle Research, Senior Editor for IEEE's Transactions in Nanotechnology, and Member of Berkshire Corporation's Board of Directors. He also co-founded/co-chaired the International Technology Roadmap for Semiconductor's (ITRS) Emerging Research Materials (ERM) International Technology Working group (ITWG).