

# **Nanomanufacturing in Semiconductor Microelectronics**

David K. Ferry

*Department of Electrical Engineering and Center for Solid State Electronics Research  
Arizona State University, Tempe, AZ 85287-5706*

The semiconductor industry has been involved with nanomanufacturing for more than a decade, since the current generation of microprocessors involves critical dimensions of only 35 nm laterally and 1 nm vertically. Yet, the continued evolution of these chips to even denser arrays of logic elements means that smaller dimensions must be utilized, with control across wafers sizes of 300 mm. These demands place strains not only on the manufacturing, particularly lithography, but also on the understanding of the physics of individual transistors within the logic array. Here, these points will be discussed along with novel new approaches for vertical device growth, and for understanding of the quantum physics of these devices.