

Micro/Nanoelectronics: Towards End of Scaling and Beyond

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Abstract - This seminar is divided into two parts: In the first part, some general trends in nanoscale silicon-based CMOS chip technology will be briefly reviewed. As one of the examples of the global industrial effort on pushing forward ultra-scalable IC technology, research on non-conventional transistor structure will be reflected with the focus on “three-dimensional” FinFET. In the second part of the seminar, the role of emerging nanostructures and nano-devices in the “post-silicon” era will be discussed. Graphene has received significant interests from both academia and industry lab, attributed to its distinctive layered configuration, band structure, and quantum phenomena. The atomically-thin sheets could be potentially grown by conventional thin-film techniques. While graphene has been explored as both active and passive elements in future electronics, its gap-less nature implies fundamental limits that promote innovations in device principle and material engineering. This seminar will introduce research results in prototype demonstrations of logic switches, non-volatile memories, on-chip interconnects, and sensors on emerging 2D nanostructures and heterostructures. Major challenges and near-future research opportunities will be highlighted.

Biography - Dr. Yu received Ph.D. degree in Electrical Engineering from University of California at Berkeley. His academic career includes positions at Stanford University, State University of New York, and Zhejiang University. His research is in the field of solid-state devices, nanoelectronics, sensors, and nanomaterials. Specific interests include post-CMOS/post-Si devices, non-volatile memories, “post-Cu” carbon-based interconnects, sensors, solar cells, and other emerging devices based on 1D/2D/3D nanostructures. He has authored/co-authored 8 book/contributed book chapters, more than 260 research papers, and was the speaker of more than 120 keynote/invited talks to conferences, professional societies, universities, national labs, and industry around the world. As one of the most prolific inventors in micro/nanoelectronics, he has more than 300 awarded U.S. patents and several dozens of European/Japanese/Taiwanese patents. Dr. Yu served on the invited panels and advisory/organizing/technical program committees of many international conferences, serving as chair, co-chair, or member. He was/is Editor of IEEE Electron Devices Letters, Associated Editor of IEEE Transactions on Nanotechnology, Editor of Nano-Micro Letters, and Guest Editor of IEEE Transactions on Electron Devices and IEEE Transactions on Nanotechnology. He is the Fellow of IEEE, Fellow of National Academy of Inventors, and recipient of IEEE Distinguished Lectureship and IBM Faculty Award. His prior research accomplishments include the world’s first THz silicon CMOS transistor and the world’s first 10-nm gate length FinFET, among many others.