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TOPIC:
Variability-Tolerant Scaled MOSFET Device Structures

ABSTRACT:
In this presentation, process variability-tolerant planar CMOS device structures are discussed for continued scaling of MOSFET devices to its ultimate limit. Process variability has severely impacted the delay and power variability in VLSI devices, circuits, and chips, and its impact keeps increasing as MOSFET devices and CMOS technology are continually scaled down. The impact of the increasing amount of within-die process variability on the yield of VLSI circuits, such as SRAM, has imposed an enormous challenge to design advanced VLSI chips using bulk-CMOS technology. In order to mitigate the risk of process variability, new statistical design methodologies have evolved. Though, these statistical modeling techniques allow designers best possible solution to optimize the impact of variability, however, process variability constraint limits the circuit performance and yield. Therefore, to mitigate the risk of process variability, variability-tolerant device architecture is required. In this presentation, a number of possible bulk-MOSFET device structures are described for the continued scaling of conventional MOSFET devices for advanced CMOS technology.

PROFILE:

Samar K. Saha received the Ph.D. degree in Physics from Gauhati University, India and MS degree in Engineering Management from Stanford University, USA. Currently, he is a Technical Advisor at Ultrasolar Technology, Santa Clara, USA and an Adjunct Professor in the Electrical Engineering department at Santa Clara University, USA. He has worked in various positions for National Semiconductor, LSI Logic, Texas Instruments, Philips Semiconductors, Silicon Storage Technology, Synopsys, DSM Solutions, Silterra USA, and SuVolta. In academia, he worked as a faculty member in the Electrical Engineering departments at Southern Illinois University at Carbondale, Auburn University, University of Nevada at Las Vegas, and the University of Colorado at Colorado Springs. He has authored numerous research papers, one book, and one book chapter, and holds 10 US patents.

Dr. Saha is the President-Elect of the IEEE Electron Devices Society (EDS), an elected member of the EDS Board of Governors, Editor-In-Chief of QuestEDS, and a member of the IEEE TAB Periodicals Committee.