Guest Speaker
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Topic
“Performance Limitations of Cu/low-\(\kappa\) Interconnects and Possible Future Alternatives”

Abstract: Looking into the future, the relentless scaling paradigm is threatened by fundamental limits including excessive power dissipation, insufficient communication bandwidth, and signal latency for both off-chip and on-chip interconnects. The paradigm shift toward multi-cores requires many longer global interconnects to communicate between cores, further making these problems worse. Many of these obstacles stem from the increase in copper resistivity, as wire dimensions and grain size become comparable to the bulk mean free path of electrons in copper (~40nm). Thus, it is imperative to examine alternate interconnect schemes for future ICs. In this review the limits of Cu/low-\(\kappa\) interconnects will be examined and possible advantages of two alternative technologies will be explored: (1) optical interconnects and (2) carbon nanotubes (CNT). Possible methods of integration of these technologies on the Si platform will be discussed.

About the Speaker

Prof. Krishna C. Saraswat received his Ph.D. in Electrical Engineering from Stanford University in 1974. He is Rickey/Nielsen Chair Professor in the School of Engineering, Professor of Electrical Engineering and by courtesy, Professor of Materials Science & Engineering at Stanford University. His research interests are in new and innovative materials, structures and process technology of silicon, germanium and III-V devices, and interconnects for VLSI and nanoelectronics. He has graduated more than 75 doctoral students and has authored or co-authored over 650 technical papers.

Prof. Saraswat is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). He received the Thomas Callinan Award from The Electrochemical Society in 2000 for his contributions to the dielectric science and technology, the 2004 IEEE Andrew Grove Award for seminal contributions to silicon process technology, Inventor Recognition Award from MARCO/FCRP in 2007, the Technovisionary Award from the India Semiconductor Association in 2007 and the SIA Researcher of the Year Award in 2012. He is listed by ISI as one of the 250 Highly Cited Authors in his field.