Sub-millimeter Wave CMOS Integrated Circuits and Systems

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Electromagnetic waves in the sub-millimeter wave or terahertz (300GHz – 3THz) region of spectrum have been utilized in spectroscopy, in active and passive imaging for detection of concealed weapons and chemicals, and in short range radars. They can also be used for secured high data rate communications. Typically compound semiconductor devices are employed to construct the systems for these applications. The high cost and low level of integration of those devices have limited the proliferation of these applications. Recent progress in CMOS (Complementary Metal Oxide Silicon) integrated circuits (IC’s) and SiGe HBT technologies has made it possible to consider silicon technology as an alternative means for realization of capable and economical systems that operate at 200 GHz and higher. The performance of devices as well as signal sources and detectors operating between 100 and 900 GHz fabricated in silicon CMOS technologies will be discussed. Based on these, paths to terahertz CMOS circuits and systems including key challenges that must be addressed are suggested. The potential applications and challenges make the sub-millimeter wave CMOS an exciting area of research for the silicon integrated circuits community.

Biography: Kenneth O received his S.B, S.M, and Ph.D degrees in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology, Cambridge, MA in 1984, 1984, and 1989, respectively. From 1989 to 1994, Dr. O worked at Analog Devices Inc. developing sub-micron CMOS processes for mixed signal applications, and high speed bipolar and BiCMOS processes. He has been a professor at the University of Florida, Gainesville from 1994 to 2009. He is currently the director of Texas Analog Center of Excellenc and TI Distinguished Chair Professor of Analog Circuits and Systems at University of Texas at Dallas. His research group is developing circuits and components required to implement analog and digital systems operating between 1 and THz using silicon IC technologies. He was the general chair of the 2001 IEEE Bipolar/BiCMOS Circuits and Technology Meeting. Dr. O has also served as an associate editor for IEEE Transaction on Electron Devices from 1999 to 2001. Dr. O was a member of ADCOM of IEEE Solid-State Circuits Society between 2009-2011. He chairs the Meetings Committee of IEEE Solid-State Circuits Society. He has authored and co-authored ~200 journal and conference publications, as well as holding nine patents. Dr. O has received 1996 NSF Early Career Development Award. Prof. O is also an IEEE Fellow.

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