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講題：THz Electronics for Sensing and Communication Applications

Abstract

THz science and technology can be employed for many useful applications, such as high-speed wireless data communication, non-invasive biomedical imaging, stand-off detection of weapons and explosives in public places, etc. Moreover, THz wave is nonionizing, very safe technology as compared to the X-ray. Many THz products based on the optical technology can be found on the market. However, these products are bulky and high cost. Using an electronic approach, particularly utilizing integrated circuits and systems in CMOS technologies, is a good alternative to solve the aforementioned drawbacks of the optical one. CMOS technologies are capable of providing high integration of analog and digital circuits, small form factor for integrating THz systems on portable devices, and high yield for mass production. However, THz designs using CMOS technologies are challenging due to low supply voltage, limited transistor speed, lossy silicon substrate, and unfriendly back end of the line. In this talk, I will present the state-of-the-art CMOS THz devices, circuits, and transceiver architectures to solve the aforementioned issues, including low-loss interconnects, higher-order-mode high-gain dielectric resonator antennas, a heterodyne receiver, a balun-less frequency multiplier, a harmonic oscillator supporting different output, a heterogeneously-integrated THz transmitter, and a scalable phased-array architecture. Some of these devices and circuits are successfully employed to demonstrate THz transmissive imaging systems with the best spatial resolution of 1.4 mm at 336 GHz.

Biography

Chun-Hsing Li was born in Yilan, Taiwan, in 1983. He received the B.S. degree in electrophysics and M.S. and Ph.D. degrees in electronics engineering from National Chiao Tung University, Hsinchu, Taiwan, in 2005, 2007, and 2013, respectively. In 2014, he joined MediaTek, Hsinchu, Taiwan, as a Senior Engineer. In 2014 and 2018, he joined the Department of Electrical Engineering, National Central University, Jhongli, Taiwan, and the Department of Engineering and System Science, National Tsing Hua University, Hsinchu, Taiwan, respectively, as an Assistant Professor. In August 2020, he joined the Department of Electrical Engineering and Graduate Institute of Communication Engineering, National Taiwan University, Taipei, Taiwan, where he is currently an Associate Professor. His current research interests include RF, millimeter-wave, and terahertz integrated circuit and system design.

Dr. Li was a recipient of Outstanding Young Scholar Award from Taiwan IC Design Society 2020, the FineTek Technology Gold Award 2013 and the Best Paper Award (中國工程師學會「詹天佑論文獎章」) from the Chinese Institute of Engineers 2013. He was a co-recipient of the Best Paper Award of the 13th IEEE International Conference on Electronics, Circuits, and Systems, Nice, France, 2006.