09/26 MSE SEMINAR

Monolithic Three-Dimensional Technologies toward Brain-Mimicking IC Hardware

Speaker: Albert Chin (荊鳳德 教授)

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Albert Chin received the Ph.D. degree in electrical engineering from the University of Michigan. He was with AT&T Bell Labs, General Electric Electronic-Lab, Texas Instruments SPDC, and visiting professor at National University of Singapore. He is a Chair Professor of National Chiao Tung University.

He is a pioneer on low DC-power high-k CMOS and high-k Flash memory, low switching-power 3D IC, high RF-power asymmetric-MOSFET, Si THz devices, and resonant-cavity photo-detector. He has co-authored >500 papers, two *Top 100 Scientific Reports Physics papers* in both 2017 and 2018, and 7 *Highly Cited Papers*.

Dr. Chin has served as Subcommittee Chair and Asian Arrangements Chair of IEDM Executive Committee, Editor of IEEE Electron Device Letters, IEEE ED Society SRC Chair, and two Technical Committee Chairs on "*Electronic Materials*" and "*Compound Semiconductor Devices & Circuits*". He is an *IEEE* Fellow, *Optical Society of America* Fellow, and *Asia-Pacific Academy of Materials* Academician.

Abstract

The delay and power consumption are the major limitation for advanced microprocessor. To address these issues, previously we pioneered the 3D IC (*IEDM* 2004), where the package-level 3D IC has been implanted in real manufacture in 2016. Unfortunately, the interconnect density using package technology is limited by the small density of Through-Silicon Via (TSV). This is because the TSV requires large size of ~μm due to the limited aspect ratio via thinned Si wafer of ~50 μm, the mechanical strength of thinned Si wafer, and the thermal mismatch between Si wafer and TSV Cu. In this talk, monolithic 3D IC architecture using high-mobility MOSFET and memory devices will be presented. This is the enabling technology for future hardware of brain-mimicking IC. The 3D IC is the present and future technology trend to improve the circuit speed, power consumption, integration density, down-scaling, cost, and performance gap to bio system. The 3D IC is especially important since the down-scaling 2D IC will soon reach the quantum-mechanical limit around 2020.

09/26 (四) 15:30-17:30

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