3D-Stacked DRAM Technology and Function-in-Memory Solution,

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Kyomin Sohn received the B.S. and M.S. degrees in Electrical Engineering in 1994 and 1996, respectively, from Yonsei University, Seoul. From 1996 to 2003, he was with Samsung Electronics, Korea, involved in SRAM Design Team. He designed various kinds of high-speed SRAM for external cache and buffer memory. He received the Ph.D. degree in Electrical Engineering and Computer Science in 2007 from KAIST, Daejeon, Korea. He rejoined Samsung Electronics in 2007, where he has been involved in DRAM Design Team. He is a Master (Technical VP) in Samsung and he is responsible for design and development of HBM (High Bandwidth Memory) DRAM. His interests include the next generation 3D-DRAM, robust memory design, and processing-in-memory for artificial intelligence applications. In addition, he has currently served as a Technical Program Committee member of Symposium on VLSI Circuits since 2012.

Abstract: Advances in 3D-stacked DRAM technology has been essential in today's High-Performance Computing (HPC) and AI applications. HBM (high bandwidth memory) DRAM can provide unparalleled high bandwidth by ultra-wide IO utilizing 3D-stacked DRAMs with TSV technology. An advanced 2.5D integrated packaging technology using Si-interposer is also one of the key enablers for the critical HBM DRAM. However, there are many challenges in realizing systems with these technologies like power density, thermal dissipation, testability and reliability of 3D-DRAM stacking in 2.5D configuration. All these topics will be explained and discussed in this talk. Furthermore, data-centric and memory-intensive computing are pursued actively because of big data and the efficient use of it. HBM DRAM has great possibility for more efficient and powerful near-memory computing. In this talk, a Function-in-Memory (FIM) solution as a near-data-processing platform will be provided with various considerations based on the technology fundamentals covered in this short course.