PURDUE UNIVERSITY | Elmore Family School of Electrical and Computer Engineering

Faculty Candidate Seminar
Professor of Engineering Practice, Semiconductor

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MSEE 112

Semiconductor Industry and Technology Trend from the Perspective of Memory Devices

Abstract: In recent years, the rapid development of AI has brought major changes to the semiconductor industry and demands for GPU as well as high performance memory has exploded. Automotive industry including electric vehicles are also expected to increase steadily, leading to sustained growth in the semiconductor market. In terms of memory devices, significant shifts are being observed to respond the rapidly changing market. First, continuous scaling down of memory cell increases fabrication difficulty exponentially which requires breakthrough. For instance, introduction of novel technologies like EUV lithography or new DRAM architecture is required. Secondly, while companies previously competed by manufacturing the same product at low cost, there is a shift in business strategy where they now focus on high value-added memory devices tailored to customer needs, such as high bandwidth memory (HBM). In other words, aspects such as power and speed are becoming increasingly important, necessitating innovations in memory logic circuit and back end of line processes such as bonding and packaging. Finally, many countries learned the importance of semiconductor supply chain through a chip shortage triggered by the COVID-19 pandemic. It has elevated the competition and support from the national level beyond the private sector to mitigate geopolitical risks. Semiconductors are now becoming an industry intertwined with politics, economy, and security, competing between countries.

Bio: Doosan Back is a senior staff engineer at Samsung Electronics memory business division. He is currently working on DRAM process integration at process architecture (PA) team and oversees development of core/peripheral logic transistor in DRAM as a team lead. Before joining Samsung, he earned his Ph.D. at Purdue University. His Ph.D. research was engaged on micro/nanofabrication and packaging, and he was involved in diverse research on the applications of micro/nanodevices.

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