

MATERIALS AND BIOMATERIALS SCIENCE AND ENGINEERING

Building Digital Twin in Semiconductor Process Technology

ABSTRACT: The semiconductor industry plays a critical role in the global economy, driving innovation and powering a wide range of technologies from smartphones to supercomputers. As the demand for artificial intelligence grows, so too does the need for increased computational power and memory capacity. These components are manufactured in highly specialized clean rooms known as fabs. The importance of the semiconductor industry has become increasingly geopolitical, with the US Chip Act providing significant support for the development of semiconductor manufacturing talent in the US. However, the semiconductor industry is complex and requires substantial investment. In the era of AI, the use of digital twins with AI-aided TCAD tools is becoming more prevalent, allowing for reduced development time and fewer design experiments.

In this talk, I will provide an overview of the challenges faced in semiconductor process development and how AI can be utilized in TCAD simulations to create digital twins of the physical process. While we are still in the early stages of digitizing the physical process, incorporating physical laws into TCAD simulations is crucial for making digital twins a reality. The seminar will discuss the potential benefits and limitations of using AI in TCAD simulations and the future direction of semiconductor process development.

BIOGRAPHY: Yan Li received her B.S. degree in Modern Physics from the University of Science and Technology of China. She received an M.S. and Ph.D. in Materials Science and Engineering from Lehigh University in Pennsylvania, USA. In 1998, she joined SanDisk Corporation, Sunnyvale, CA, working on Flash Memory Technology. She led teams that designed many generations of NAND flash memory, including the industry's first 3 bits per cell NAND memory, and brought them into production. She has presented papers at many International Solid State Circuit Conferences (ISSCC), and in both 2008 and 2012 her papers won the Lewis Winner Award for best paper. She is currently a Vice President for memory design, leading the advanced 3D NAND development. She also served on the ISSCC Memory and Machine Learning Technical Paper review committee. She is currently serving VLSI Symposium as a technical paper review member.

She has created many innovative ideas to improve NAND products, and holds more than 200 patents.



Yan Li

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Refreshments: 1:45pm, Seminar: 2-3pm