PiAI Seminar Series: Physics informed AI in Plasma Science
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Web Seminar

Multiscale Design for Optimizing Semiconductor Process using
Computational Science and Artificial Intelligence

Byungjo Kim

Graduate School of Semiconductor Materials and Devices Engineering,
Ulsan National Institute of Science and Technology,
50 Unist-gil, Ulsan 44919, South Korea
kbjg0917@gmail.com

Abstract

Semiconductor manufacturing is undergoing rapid advancements, driven by device scaling complexity. This presentation integrates computational science and AI to understand machine-level parameter variations and their impact on material processing. Simulations play a crucial role in decoding complex interactions at the processing surface.

A multiscale approach, using Molecular Dynamics and Density Functional Theory, analyzes atomistic-level interactions, informing larger-scale computational methods through scale bridging. This approach deepens understanding of feature pattern evolution and wafer-scale behaviors.

The presentation explores how process variables affect plasma attributes and processing surfaces, linking them to material responses. It also highlights combining simulation techniques with machine learning for precise control over pattern shapes and material properties in semiconductor manufacturing.

[1]   J. Trieschmann, L. Vialetto, T. Gergs, J. Micro/Nanopattern. Mats. Metro **22**, 4 (2023)

[2]   B. Kim, J. Bae, H. Jeong, S. H. Hahn, S. Yoo, S. K. Nam, J. Phys. D: Appl. Phys. **56**, 384005 (2023).

[3]   B. Kim, M. Kim, S. Yoo, S. K. Nam, Appl. Surf. Sci. 593, 153297 (2022)

[4]   H. Jeong, B. Kim, S. Yoo, S. K. Nam, International Conference on Simulation of Semiconductor Processes and Devices (2023)