Title: Efficient Multi-Scale Modeling of Semiconductor Device Fabrication

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Abstract

In recent years, the traditional transistor scaling has undergone a drastic transition. Instead of a relatively simple shrinking of the planar transistor, the entire geometry has been redesigned. The vertical FinFET is now being followed by a gate-all-around (GAA) transistor design which allows even more electrostatic control of the channel region from the gate bias. It has also become clear that silicon scaling is reaching its end and new materials are being investigated, both for advanced transistor nodes and for a broad range of specialized applications (e.g., wide bandgap semiconductors for power devices). Assessing the feasibility of device fabrication with new materials using experiments alone is very expensive and time-consuming, which is why process simulations are indispensable in today's micro- and nanoelectronics design cycle. In this talk, I will introduce an efficient multi-scale process simulation framework ViennaPS which we are developing to address the needs of modern semiconductor fabrication. Nowadays, it is essential to treat the problem from all scales: From atomistic to the reactor chamber itself.

Biography

Lado Filipovic is an Associate Professor at TU Wien, working on Integrated Semiconductor Sensors and Process Simulation. He obtained his venia docendi (habilitation) on Micro- and Nanoelectronics and his doctoral degree (Dr.techn.) in Technical Sciences in Engineering from TU Wien in 2020 and 2012, respectively. He has been a Principal Investigator in various research projects funded by, e.g., the EU FP7 and Horizon 2020 programs, the Christian Doppler Forschungsgesellschaft, the Austrian Science Fund (FWF), and the Austrian Research Promotion Agency (FFG). He is a Senior Member of the IEEE and is an active member of the Technical Program Committee for outstanding IEEE sponsored conferences. His primary research interest is studying the operation, stability, and reliability of novel semiconductor-based sensors using advanced process and device simulations. An additional pillar of his research is the multi-scale modeling of processes involved in the fabrication of semiconductor devices and sensors. This involves combining atomistic modeling with Monte Carlo and continuum approaches, as well as merging physical and empirical modeling in a single framework, specifically in process TCAD.