

## TCAD Models/Parameters and Tool Fusion

*Thursday 20 June 2024 17:00 (20 minutes)*

Technology computer-aided design (TCAD) simulation are crucial in modern electronic developments, as the behavior of a component can be explored before the first costly prototypes have been produced. Accurate and thus trustworthy predictions are, however, only achievable when the models and parameters provided by the user to the tools are state-of-the-art and include the most recent improvements.

For Silicon carbide (SiC), a very promising candidate for a more power efficient (e.g., in power electronics) and radiation hard (e.g., as particle detector with good timing performance) replacement of Silicon, the available models and parameters can be separated in two categories. On the one hand many different descriptions and values have been published in literature over the last century, which makes a proper selection very challenging. On the other hand, specific properties like radiation damage, have hardly been investigated yet, demanding basic level research and model building.

In this presentation we summarize our latest efforts regarding the simulation of 4H Silicon Carbide. At first we present preliminary results from our extensive literature review on TCAD model parameters. This work aims to provide an easy access for newcomers and to trigger a critical evaluation of the available values within the scientific community. We also include our latest achievements towards a 4H-SiC radiation damage model. The simulations in two distinct frameworks fit the measurements qualitatively well. The latter already showed that with increasing dose the utilized diode behaves almost identical in forward and backward direction, although the fundamental physical processes inside the device differ.

We conclude our talk with the latest information about the upcoming integration of GEANT4 simulations into the TCAD framework of Global TCAD Solutions (GTS), a company located in Vienna. We show that this update will allow a much tighter interleaving of statistical particle energy deposition and the evaluation of the signal introduced by these electron hole pairs in a time dependent electric field.

### **Type of presentation (in-person/online)**

online presentation (zoom)

### **Type of presentation (scientific results or project proposal)**

Presentation on scientific results

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