Business

Overview

Si IGBTs and Si diodes are commonly used in high-voltage power electronics ...uch as EV, HEV, railway traction, wind turbine generators, and industrial robots. TCAD simulation has been us... ...g and performance optimization of these bipolar devices for over 30 years. Recently, high-precision process sim... ...ired for these devices to improve their performance. Accurate process simulation is expected. Furthermore, preci... ...r complex carrier recombination physics is also expected to adapt various carrier lifetime control technologies.

In this project, we established calibrated TCAD setups for Hitachi's side-... ...uctivity IGBT (side-gate HiGT [1]) and diode. The calibration setups are based on Sentaurus Calibration Workbench, whi... ...ed to increase the value of TCAD by allowing users to rapidly calibrate TCAD models. We also included modeling of... ...physics for their electron beam irradiation (EBI) process. Eventually, we provided well-calibrated process and device r... ...i. The models precisely represent actual device performance, not only DC characteristics but also switching wavefo...

Modeling and Calibration by Sentaurus Calib... ...bench

Sentaurus Calibration Workbench is a tool designed to perform ... ...ons for TCAD simulation tools. It provides evaluation, sensitivity analysis, search, calibration, and machine learning fu... ...ugh Sentaurus Calibration Workbench is a standalone tool, it interacts with Sentaurus Workbench for setting up and ... ...ns. It utilizes the job scheduler of Sentaurus Workbench to speed up simulations by using distributed hete... ...uting resources.

Figure 1 shows the structure of the side-gate HiGT. In this p... ...Calibration Workbench was used initially for the calibrations to reproduce the doping profiles of ion implant... ...n. The profiles of boron, phosphorus, and arsenic were accurately fitted to SIMS measurement results. We perfor... ...ork for the geometric calibration of the gate structure at the front side and the modeling of melting laser anneal t... ...ackside impurity profiles.