TCAD Demonstration Files for SiC-JBS Simulation

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SiC-JBS Simulation

- Template files for simulation of Silicon Carbide Junction Barrier Schottky (SiC-JBS) diodes provided

- Structure generation from Crosslight/CSUPREM

- I-V Simulation from Crosslight/APSYS
  - Forward I-V Characteristics
  - Reverse current/Blocking voltage
  - 0-175C temperature range

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Wide bandgap modeling issues

- Low intrinsic carrier concentration often leads to convergence issues
- Common solutions artificially increase intrinsic concentration
  - Optical stimulation
  - Thermal stimulation
- These result in inaccurate simulations of reverse characteristics since the artificial thermal or optical currents can be comparable to the actual reverse currents
- Code implementation in Crosslight/APSYS overcomes these difficulties without artificial stimulation
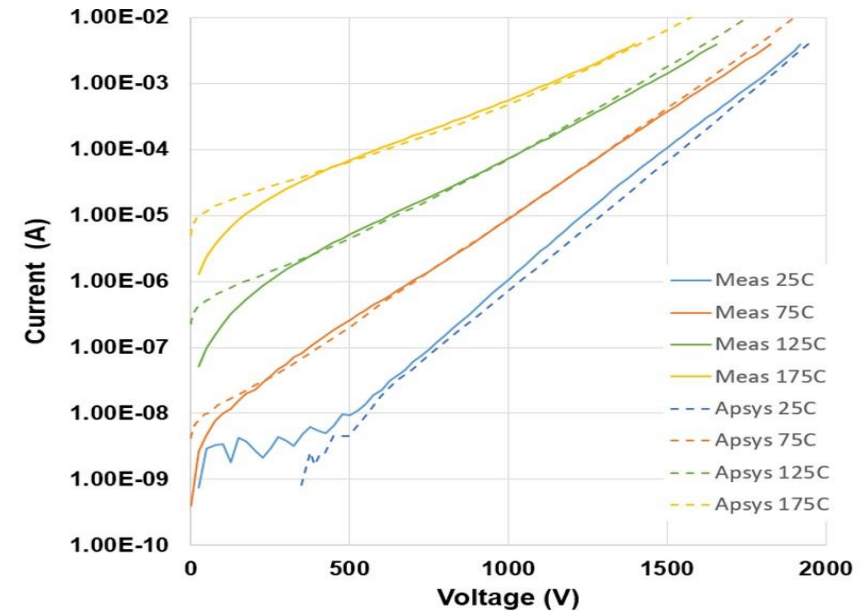
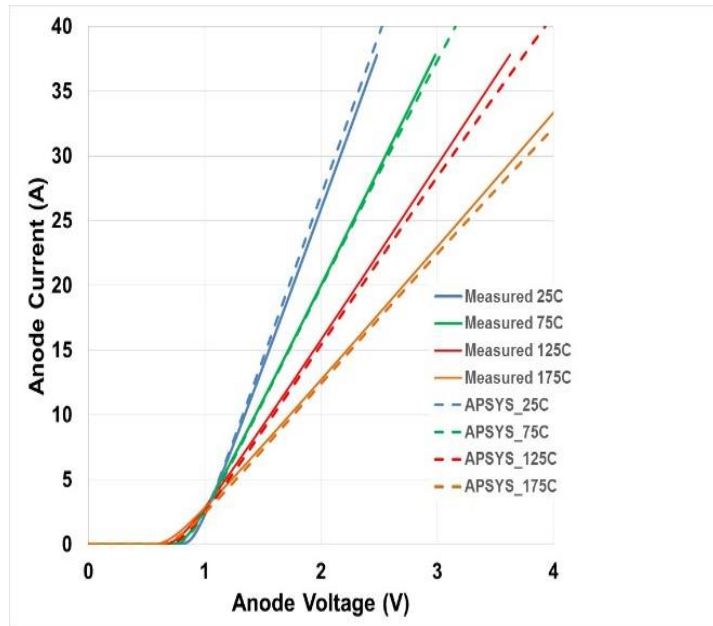**CROSSLIGHT**

Typical SiC-JBS Structure
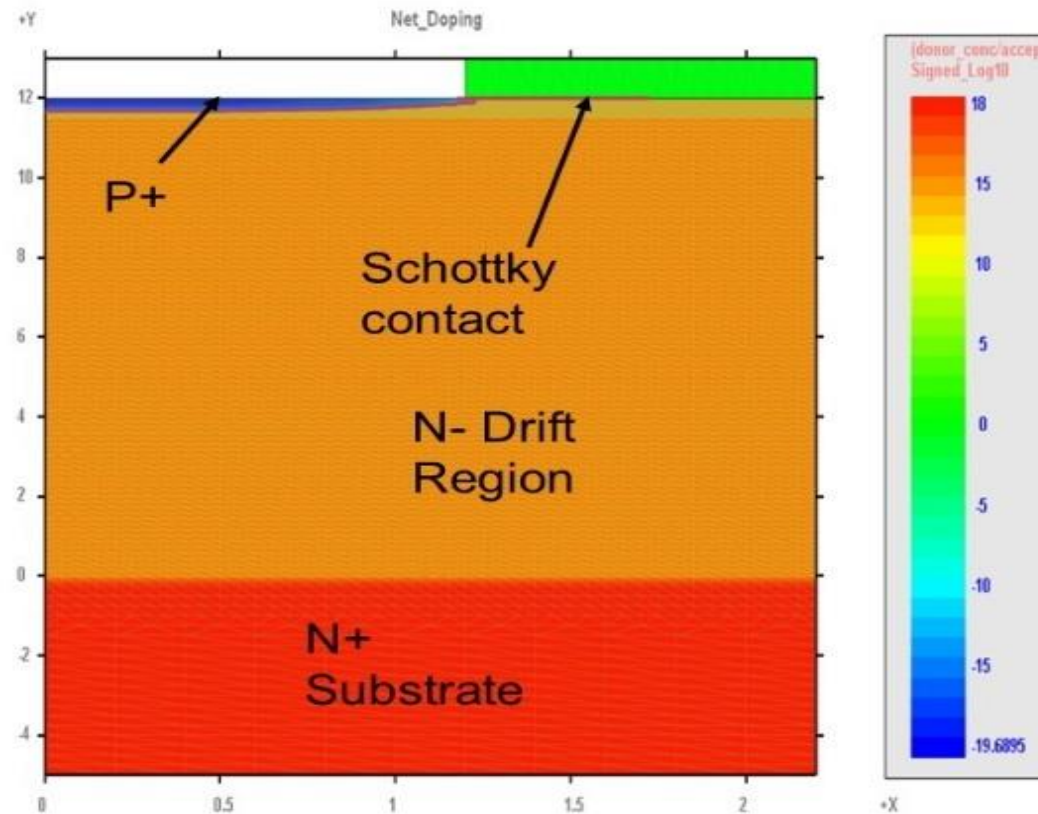
R. Radhakrishnan, T. Witt, and R. Woodin, "Temperature Dependent Design of SiC Schottky Diodes" in 2014 IEEE Workshop on Wide Bandgap Materials (WIPDA)

Advanced Physical Models

- Temperature dependent Caughy-Thomas mobility model calibrated for SiC

- Chynoweth impact ionization

- Trap assisted tunneling

Model calibration

Proper model calibration of Crosslight/APSYS produces excellent agreement to experiment over a wide temperature range for both forward and reverse simulations

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Additional information

For additional information on the demonstration files or calibration please contact
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