

β -Gallium Oxide Device Simulations in Synopsys

End of Spring 2024 Documentation

Chase A. Lotito, *SIUC Undergraduate*

1 Introduction

The following outlines the workflow I have developed using *Synopsys Sentarus* for device simulation using $\beta - \text{Ga}_2\text{O}_3$ as the semiconductor material.

This outlines adding a new material to the complete *models.par* file, ensuring the new material is a defined variable in the *datexcodes.txt* file, what parameters were changed inside the specific $\beta - \text{Ga}_2\text{O}_3$ parameter (.par) file, and how I proceeded to simulate the specific devices in breakdown.

2 Creating a custom material in Sentarus

There are two tools from Synopsys that we are actively using to construct and simulate a semiconductor device. To construct the device, we use the Synopsys Structure Editor (bash cmd: sde). To simulate the device, we use Synopsys Device (bash cmd: sdevice).

2.1 datexcodes.txt

In order for Synopsys Structure Editor to know what materials you can construct a device from, it checks the defined variables in the *datexcodes.txt* file. You can create another *datexcodes.txt* file locally in your current project's directory, and Synopsys will prioritize the variables defined in that file.

What I did was copy the *datexcodes.txt* file from