SLATT UNDERGRADUATE RESEARCH FELLOWSHIP
FINAL REPORT

SCHOLAR NAME:	Ruben Torres Gonzalez
FACULTY ADVISOR:	Prof. Patrick Fay
PROJECT PERIOD:	22 of May to 29 of July of 2023
PROJECT TITLE:	Measurement of Wide Band Gap Semiconductor Power Devices
CONNECTION TO ONE OR MORE ENERGY-RELATED RESEARCH AREAS (CHECK ALL THAT APPLY):	**(x) Energy Conversion and Efficiency ( ) Sustainable and Secure Nuclear** **(x) Smart Storage and Distribution ( ) Transformation Solar** **( ) Sustainable Bio/Fossil Fuels ( ) Transformative Wind**

MAJOR GOALS AND ACCOMPLISHMENTS

Summarize your research goals and provide a brief statement of your accomplishments (no more than 1-2 sentences). Indicate whether you were able to accomplish your goals by estimating the percentage completed for each one. Use the next page for your written report.

RESEARCH GOALS	ACTUAL PERFORMANCE AND ACCOMPLISHMENTS	% OF GOAL COMPLETED
Found efficient ways to measure each semiconductor.	Different ways of measuring were examined and experimented for. Using two probes with the semiconductor attached to a cupper plaque and silver between them two was a step forward.	100
Verify how the length of the used cables impact on the behavior of the conductivity.	Different cable sizes were used to examine the behavior of the current. It was found that the shorter the cable the less the ringing, but then the device was not conducting. It needs to be examined why the device is not conducting with shorter cables.	75
Analyze the behavior of the semiconductors once the reverse bias voltage is applied.	After extent simulations it was found how the device was supposed to behave and what we should expect to see each time it was simulated.	100

RESEARCH OUTPUT

Please provide any output that may have resulted from your research project. You may leave any and all categories blank or check with your faculty advisor if you are unsure how to respond.

CATEGORY	INFORMATION
EXTERNAL PROPOSALS SUBMITTED	(Sponsor, Project Title, PIs, Submission Date, Proposal Amount)
EXTERNAL AWARDS RECEIVED	(Sponsor, Project Title, PIs, Award Date, Award Amount)
JOURNAL ARTICLES IN PROCESS OR PUBLISHED	(Journal Name, Title, Authors, Submission Date, Publication Date, Volume #, Page #s)
BOOKS AND CHAPTERS RELATED TO YOUR RESEARCH	(Book Title, Chapter Title, Authors, Submission Date, Publication Date, Volume #, Page #s)
PUBLIC PRESENTATIONS YOU MADE ABOUT YOUR RESEARCH	(Event, Presentation Title, Presentation Date, Location)
AWARDS OR RECOGNITIONS YOU RECEIVED FOR YOUR RESEARCH PROJECT	(Purpose, Title, Date Received)
INTERNAL COLLABORATIONS FOSTERED	(Name, Organization, Purpose of Affiliation, and Frequency of Interactions)
EXTERNAL COLLABORATIONS FOSTERED	(Name, Organization, Purpose of Affiliation, and Frequency of Interactions)
WEBSITE(S) FEATURING RESEARCH PROJECT	(URL)
OTHER PRODUCTS AND SERVICES (e.g., media reports, databases, software, models, curricula, instruments, education programs, outreach for ND Energy and other groups)	(Please describe each item in detail)

RESEARCH EXPERIENCE

Please let us know what you thought of your research experience: Did this experience meet your expectations? Were lab personnel helpful and responsive to your needs? What else could have been done to improve your experience or achieve additional results?

This was my first research experience of my college life, so I did not know what to expect. Now that this opportunity has ended, I can say I learned a lot through this experience. It has put my expectations high for futures experiences. The people I met throughout this experience were really patience, helpful and nice towards me. The only thing that could have been done to improve my experience was to be able to pass more time with the graduate student that I was assigned to (she needed to leave to another internship three weeks into my research).

FINAL WRITTEN REPORT

(Please use the space below to describe your research project and objectives, any findings and results you can share, and graphs, charts, and other visuals to help us understand what you achieved as a result of this research experience.)

The research project I have been working throughout the summer was "Simulation and Characterization of Wide Band Gap Power Devices". During this research our objectives were to learn how the semiconductors were supposed to behave and base on this look for efficient ways to measure each semiconductor. Through the process we learn that attaching the semiconductor to a cupper plaque using silver gave us the option of using two probes instead of one. This gave us more accurate measurement each time a simulation was made. We learn too that the length of the cables was creating a sort of oscillation that could be called ringing. The longer the cable the more the ringing the semiconductor would experiment in each simulation. We then start using shorter cables and the ringing was diminished, but the semiconductor was still experiencing some ringing. This research should be continued to keep looking for ways to eliminate the ringing completely without affecting the conductivity of the semiconductor. This is an important research because semiconductors are used in our daily life devices, so we need them to be the most reliable they can be. This can only be achieved by making sure the semiconductors designed and build are working properly and as expected. As tedious as measuring can be, because is a repetitive process, is really important to be a well-executed process.