EE 491 Weekly Report

Week 10: 10/28-11/3

Group: *May14-03* **Advisors:** *Dr. Sumit Chaudhary, John Carr* **Client:** *ISU NanoLab*

Members: *Andersen, Martin; Diallo, Mouhamadou; Rodriguez, Nicholas; Straquadine, Joshua (Leader)*

Project Title: *"Design and implementation of cryogenic current measurements on organic photovoltaic cells"*

Weekly Summary

This week we worked more in-depth with the epoxy (with some frustrating results), designed a new probe system with lower thermal mass, and discussed our strategy for completing the project plan.

Meetings

10/31 Lab Meeting

Duration: *2 hours* **Members Present:** *All*

Purpose and Goals:
At this meeting, we planned to test some of our epoxy samples to see if we were able to make contact through the encapsulant. Our advisor mentioned, though, that an epoxy sample that he had run through thermal cycling had failed catastrophically so we attempted to duplicate his results.

Achievements:

- Found that the epoxy undergoes some sort of reaction with the active photovoltaic layer when cooled, something which we could not have predicted. This meant that our idea of epoxy is not a valid solution to our thermal interface problem.
- Decided that the way to move forward will be to design a better probe device with lower thermal mass than the original.

11/3 Lab Meeting

Duration: *6 hours* **Members Present:** *All*

Purpose and Goals:
Test to see if epoxy could possibly be a replacement for the thermal pad and work further on the probe setup.

Achievements:

- Found that the epoxy does not adequately act as a thermal pad, which means that the epoxy will not be used at all on the samples as intended.
- Attempted numerous different solutions to the probe mass problem, finally deciding on one which was similar to the old system

Pending issues

We were all disappointed by the odd reaction between the epoxy and the photovoltaic layer. What that means, then, is that all of the materials we attempted to use to solve our problems have failed, so we're back to square one on the thermal interface. Within the frame of a research project, all of our discoveries, while negative, are at least steps in the right direction, but when examined as a design project, we all feel like we're falling behind as we continue to find new limitations to our proposed solutions.

Plans for next week

Next week we will focus on completing the probe setup, refining the cold shroud and insulation, and making some more measurements to determine how each improvement helps us to reach our goal of 80 K. We will also spend a significant amount of time working on the first draft of the design document.

Individual Contributions

- Andersen, Martin: Attended meetings, helped design a new probe system (6 hr)
- Diallo, Mouhamadou: Attended the meetings, helped design a new probe system (7 hr)
- Rodriguez, Nicholas: Attended meetings, helped design a new probe system (6 hr)
- Straquadine, Joshua (Leader): Attended meetings, helped design new probe system, began outline of design document (9 hr)