EE / CprE / SE 491 - sddec24-21

CdSe Solar Cell

Week 2 Report

Feb 7 – Feb 13

Client: Vikram Dalal

Faculty Advisor: Vikram Dalal

Team Members:

Payton Bills – Team Lead | Client Interaction

Anders Peterson – Client Interaction | Component design

Michael Thomas – Individual Component Design | Testing

Drew Jensen – Individual Component Design | Testing

Jacob Steffens – Simulation research | Research aid discovery and distribution

Jonathan Timm – Simulation research | Simulation testing

Past Week Accomplishments

This week was spent understanding the requirements, deliverables, and research needed to move forward with the project.

- **Team meeting** – Set a list of questions for our project advisor, Professor Dalal. Additionally, we talked about who would be more on the fabrication side of the project and who would be more on the side of conducting the feasibility study.
    - As of now, there are three groups that will be mainly responsible for fabrication, feasibility study, or both
        - **Fabrication:** Payton, Anders
        - **Feasibility:** Jonathan, Jacob
        - **Both:** Michael, Drew
- **Advisor Meeting** – In the advisor meeting, we asked a host of questions we believed to be crucial to moving forward with the project. Through this, we learned:

    - **Deliverables:**
        - Design and fabrication of a CdSe solar cell with a goal of ~5% efficiency
        - Possible research paper
    - **End goal:**
        - CdSe will have the intended use as a tandem cell with traditional Si cells
    - **What we need to learn:**
        - How to estimate costs
            - Bulk cost of Cd and Se
        - Learn CdSe material properties and current manufacturing technology
        - Thermal evaporation process
            - Cost
            - Accessibility
        - Simulation tools – pveducation
        - Statistical analysis
        - Shockley Quessier limits and how to calculate expected efficiencies
        - Close-Spaced transport and Close-Spaced vapor transport
        - Why and how CdSe and Si would be used in tandem
        - Replacing Si with CdSe + Si
        - Read Behrang Begheri's thesis as a source
- Created a Google Drive to save all of our research and documents to
    - Created templates to help guide some of our documents and make them consistent as we continue

---

Pending Issues

Now that we know more about what we need to do to move forward with the project and what specific topics we need to research, we now need to make an effort to more clearly break up the group roles as to who researches what topics and how to bring all of the research topics together for a design.

- Break apart research topics to better reflect our roles on the team
- Continue with more focused and guided research based on what we learned in our meeting with Professor Dalal
- We need to create a timeline to get a rough estimate of how long our tasks should take us

---

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Payton Bills	Met with Dr. Dalal to ask clarifying questions about the project and started research on Shockley-Queisser limit to build the foundations for understanding tandem junction solar cells.	6	14
Anders Peterson	Met with Dr. Dalal for a research meeting and learned about CdSe as a material. Continued to research the physics of solar cells. Was sick for most of the week, so not much progress was made.	3	10
Michael Thomas	Research covered topics concerning photon characterization, flux, power density, spectral irradiance, Fermi energy, absorption, and recombination. Google Drive – weekly report template, updated some of my research notes, and made an Excel sheet to keep track of our research sources.	6	17
Drew Jensen	Went to meet Vikram Dalal. Continued reading material given to understand solar cells. Started research on how cell manufacturing happens.	3	10
Jacob Steffens	Met with Vikram Dalal. Weekly meeting. More reading on solar cells.	2	9
Jonathan Timm	Attended research meeting with Dr. Dalal. Began researching statistical methods applying to semiconductor physics as well as the economics surrounding our project. Went to 590 lecture.	3	11

Plans for Coming Week

Over the next week, we will further our research of the topics mentioned in our meeting with Professor Dalal, and we will make an effort to more clearly define our team's roles as to who researches what topics based on their role in our deliverables.

- Continue research with a more focused end goal in mind
- Break the team down into groups for who researches specific topics

---

Gitlab Activity Summary

Nothing to report.
