

# The Clean Energy Fund Grants - Application

Please thoroughly read the call for applications prior to submitting your proposal. We will not consider incomplete applications. **In order to be reviewed by the committee, applicants must first submit their proposal to the campus area responsible for oversight in order to receive preliminary approval.** Applications receiving preliminary approval or questions regarding the application process should be e-mailed to the coordinator at [cleanenergy@evergreen.edu](mailto:cleanenergy@evergreen.edu) before the deadline.

Funded by Students  
The Clean Energy Committee

## Project Title

Porphyrin Dye-Sensitized Solar Cells

## Project Lead

Daniel J Polking Jr

A NUMBER

PHONE

E-MAIL

## Student, Staff or Faculty Group

Pessiki Research Group

## STUDENTS

Undergraduate - Chemistry

## FACULTY OR STAFF

Organic Chemistry

## Faculty or Staff Sponsor

Dr. Peter J Pessiki  
[pessikip@evergreen.edu](mailto:pessikip@evergreen.edu)

## Campus Location

3052

## Primary Affected Area

N/A

## Requested Budget

\$1803.94

## Academic Term

Fall-Spring

## Date

11/27/2012-unknown

## Project Description (140 words or less)

The aim of our project is to assemble photovoltaic cells based on the Grätzel cell. The major focus of this work is the synthesis and purification of different porphyrins; which are the light absorbing components of our cells.

It is a known fact that the petroleum reserves on the planet are finite. Moreover, the use of fossil fuels generates hazardous byproducts. Using nature as a model, in particular photosynthesis, our goal is to build a photo driven chemical device. This machine will be able to convert sunlight into energy that can be used in place of fossil fuels.

Last year we were able to develop an understanding of how solar cells and our porphyrins function together. This year we hope to expand upon that knowledge improving our solar cell design utilizing the porphyrins of varying structure to capture light.

## Timeline

At present we are capable of creating a small number of Grätzel cells and will be continuing to do so throughout the year. We will prepare cells based on the different porphyrins we synthesize. The progress at which we do this is contingent on the success of our different syntheses and the time it takes to complete them. Our hope is to complete porphyrin syntheses focusing on a basic design and then expanding to those with electron withdrawing and donating groups present. At the beginning of Spring quarter an update will be submitted to the CEC on our progress and at the beginning of May a poster will be made to be presented at the Science Carnival.

## Metrics

The synthetic process for production, purification and characterization of different porphyrin dyes is costly, primarily due to the amount of labor required and chromatography supplies. For each synthesis batch we can expect a cost of approximately \$500 in resources.



**Areas affected by proposed project**

Prior to a full review by the Clean Energy Committee, all grants must receive preliminary approval from the campus area to be responsible for the administration and oversight of the grant. Please refer to the call for applications for help identifying the area of best suited for oversight of your project. If you have further questions regarding areas affected by your project please contact the coordinator at [cleanenergy@evergreen.edu](mailto:cleanenergy@evergreen.edu). Be sure to allow yourself enough time to communicate with staff and faculty before the deadline. When preliminary approval is received, please have the affected area submit an e-mail of support for your proposal.

**Project Title**

Porphyrin Dye-Sensitized Solar Cells

**Other Participants**

Tristan Workman  
microdaddy@comcast.net

**CEC Notes (for office use)**

Affected Area	Approval Required	Approval Received
Faculty / Staff Sponsor	Always	Yes
Associate Vice President for Academic Budget and Financial Planning		
Advising		
Athletics and Recreation		
Campus Land Use Committee		
Director of Facilities		
Director of Student Activities		
Environmental Health & Safety Officer		
Residential and Dining Services		
Science Operations Manager		
Tacoma		

**Greener Categories (Please select all that apply):**

	Research	Implementation	Education
Renewable Energy			
Resource Conservation			
Sustainability Strategies			



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#### Sustainability (140 words or less)

The use of the oxidation of water to produce energy does not, by its nature, utilize fossil fuels. Nevertheless, solar energy technology is not yet at the level that it can be implemented cheaply and effectively everywhere as an immediate replacement for other sources of power, as is acknowledged by the school's Climate Action Plan.

To improve the efficiency of solar cells there has been a significant amount of research done on the use of synthetic based systems that imitate processes found in nature. Although our research could directly affect TESC it is important to advance this research wherever it can be furthered.

#### Continuity (140 words or less)

Our research will add to the pool of knowledge in the field of sustainable solar power. The long term goal is to improve upon design and advancement in the field. This research can then be continued by future members of the Pessiki research group. Last year we were able to make two presentations at the American Chemical Society of Puget Sound undergraduate symposium and at the Science carnival. We hope to be able to repeat this for the current year and give others the opportunity to continue this work and present their findings in the future. As our focus is on the research rather than the large-scale creation and maintenance of solar cell arrays, there are no anticipated life-cycle costs beyond waste disposal, which is covered in the hazard fees shown in the budget.