# Description of Research Project/Internship

**Sponsor:** Princeton Environmental Institute  
**Position number:** A1LOO2  
**Organization/research group name:** Organic and Polymer Electronics Laboratory - Loo Group  
**Project title:** Developing the electrochromic layer for solar-powered smart windows  
**Project Summary:**

Smart windows that utilize electrochromic materials can dramatically reduce the lighting and cooling costs of buildings by offering tunable blocking of solar light and heat. However, today’s electrochromic window (ECW) technology relies on an external power supply to promote switching between the dark and transparent states of the electrochromic material. In this project, our aim is to build a self-powered ECW by combining organic solar cells with an electrochromic material, polyaniline, which can switch between its dark blue and transparent states with an applied potential of 1V. Our group has expertise on both solar cells and electrochromic materials. The marriage of these two components to create self-powered ECWs with sufficient contrast and rapid switching will require optimization of the electrochromic to match solar cell output.

**Role and responsibilities:**

The PEI summer intern will be responsible for optimizing the processing of the electrochromic layer in order to access the desired properties per specified by the limitation of our solar cell. The student will learn how to fabricate thin films of water-dispersible electrochromic polymer, polyaniline, at varying thicknesses. The student will also learn a post-deposition processing technique which changes the morphology of polyaniline thin films, and is known to affect their electrochromic switching kinetics. By changing the film thickness and morphology, the student will determine the optimized conditions for the electrochromic layer and the electrolyte choice of our solar-powered electrochromic window. The student is also expected to keep a detailed laboratory notebook about the experimental progress and present the results at the end of the internship.

**Website (if available):** http://www.princeton.edu/cbe/people/faculty/loo/group/  
**Faculty sponsor/host (name/department):** Yueh-Lin (Lynn) Loo / CBE  
**Email contact:** lloo@princeton.edu  
**Location of internship:** Princeton, NJ

- **Note:** If this internship is located in a country that appears on the U.S. Department of State Travel Warning List, final candidates will be instructed to request and receive University approval to travel to that country before participation in the internship program is confirmed.

**Weekly stipend:** $500  
**Number of internships available:** 1  
**Proposed start date (mm/dd/yyyy):** 05/30/2016  
**Total number of weeks:** 10  
**Proposed end date (mm/dd/yyyy):** 08/05/2016  

- **Note:** The funding awarded for this position is for full-time work, 35 hours per week minimum, for a period of no less than 8 contiguous weeks.
**Internship Supervisor**

Name and title: Melda Sezen, CBE Ph.D. Candidate  
Email: melda@princeton.edu  
Phone: 609-258-6714

**Experience Required**

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<tr>
<th>Academic background:</th>
<th>Knowledge of freshman chemistry is required.</th>
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<td>Technical skills:</td>
<td>No prior laboratory experience is necessary.</td>
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<td>Language fluency:</td>
<td>Must be fluent in English.</td>
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**Other**

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<th>Prerequisites / training:</th>
<th>Student must complete the required EHS laboratory safety training prior to starting the internship.</th>
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<td>Physical demands:</td>
<td>Must be capable of working in a laboratory setting</td>
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<td>Equipment requirements:</td>
<td>Necessary training will be provided.</td>
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| Visa(s) required?         | Yes [ ]  
|                           | No [ ] |
| Immunizations required?   | Yes [ ]  
|                           | No [ ] |
| Research permit/pass required? | Yes [ ]  
|                           | No [ ] |

**Additional internship information:**

Priority application deadline: January 8, 2016

- Applications received after the priority deadline will be reviewed on a rolling basis.
- Unfilled positions will remain open until March 23, 2016.

For more information and to apply, visit the Princeton Environment Institute website:  
- [www.princeton.edu/pei/undergrads/internships/](http://www.princeton.edu/pei/undergrads/internships/)