

**The Solar Energy Platform Sweden invites Swedish PhD students to a
Summer School on Solar Cells and Solar Fuels (3 cr)
August 23-28, 2015**

The participants will get an overview of research and technology in the field. They will also be able to network with their peers. The summer school involves overview lectures, discussion seminars and hands-on lab experiments at the Ångström Laboratories, as well as an excursion to the Glava R&D park with the largest solar cell module factory in Sweden.

The participants need to read material before the course. Examination will be through active participation, presentation at seminars etc. during the week of the summer school.

Start: Sunday 23/8 at 18.00, the Ångström Laboratories, Uppsala.

Buss transfer to Glava Thursday 27/8 in the afternoon

End: Friday 28/8 at 18.00 (prel) in Glava, Arvika.

Contents:

Fundamentals and technology of:

- Thin film solar cells,
- Dye-sensitized and perovskite solar cells,
- Solar fuels production by photochemical and photobiological methods.
- Energy storage

Demonstration plants; silicon solar cell module factory.

- Manufacturing technology for solar cell modules
- R&D park with different solar energy system concepts, energy storage, smart grids, 350V DC grids in buildings, Building Integration of Photo Voltaics.

The number of participants is limited to 20, with priority for Swedish PhD students. If not all places are filled also postdocs can be accepted. Registrations on the form below are binding, and should be signed and the scanned pdf sent to: leif.hammarstrom@kemi.uu.se

A confirmation will be sent within a few days. **Deadline for registration: April 15!**

The participation fee of 2500 SEK includes all meals and lodging in Uppsala and Glava (double rooms with hostel standard at Uppsala Vandrarhem Centralstationen; Hillringsbergs Herrgård in Glava) as well as the buss to Glava. The Solar Energy Platform Sweden is supported by VINNOVA.

Welcome!

Leif Hammarström, Marika Edoff och Magnus Nilsson

Course contents

Overview lectures:

Thin film solar cells (Prof. Marika Edoff)

Dye sensitized and perovskite solar cells (Doc. Gerrit Boschloo/Doc. Erik Johansson)

Photobiological fuel production (Doc. Pia Lindberg)

Solar fuels by photochemical methods (Prof. Stenbjörn Styring)

Seminars:

Light harvesting and charge separation (Prof. Håkan Rensmo)

Energy storage: batteries, H₂ storage (tba)

Life cycle analysis (Doc. Ann Magnuson, Doc. Pia Lindberg)

“Solskenshistorier” - Transformative moments in solar energy research. (tba)

Laboratory experiments.

Each participant selects three out of four experiments, in areas that are different from their PhD research project areas. The lab experiments will be supervised by experts from our different research groups.

Dye-sensitized solar cell

The lab experiment will start with preparation of the dye-sensitized TiO₂ mesoporous electrode, and measurements of the light absorption spectrum of the electrode before and after the dye-sensitization. Thereafter the electrolyte and the counter electrode will be added to prepare the full solar cell and the power conversion efficiency under white light (1 sun) conditions will be measured. Also the incident photon to current conversion efficiency will be measured to compare with the light absorption spectrum.

Thin film solar cells

In the lab experiment you will prepare thin film layers for CIGS cells by sputtering. You will learn about the preparation method and principles, as well as the role of the different layers in the photovoltaic process. You will also analyze complete cells by photovoltaic measurements (IV and EQE measurements).

Photochemical H₂ production:

Improved stability of a light-driven proton reduction catalyst.

Metal-Organic Frameworks (MOFs) are porous, crystalline materials with exceptionally high surface area. During the past years different methods have been developed to modify MOFs postsynthetically and thereby introduce a labile proton reduction catalyst into a stable MOF. In this lab, we are going to spectroscopically characterize the catalyst in solution and inside the MOF, as well as the MOF itself. We will also perform a functional study on photocatalytic proton reduction and compare the results for the catalyst in solution and in the MOF.

Photobiological fuel production

This laboratory exercise will demonstrate how we can use photosynthetic microorganisms to produce fuels or other valuable compounds, with water and carbon dioxide as substrates and light as the energy source. We will grow cultures of genetically engineered cyanobacteria, expose them to different conditions, and determine the resulting production of a fuel from the cells. From the results, we can draw conclusions about the metabolism of the cells, and gain an understanding of the possibilities of using metabolic engineering and synthetic biology to enhance productivity.

The Solar Energy Platform Sweden Summer School on Solar Cells and Solar Fuels
August 23-28, 2015
Registration form

Participant name: _____

Work address: _____

Position (e.g. PhD student): _____

Research topic: _____

Roommate preferences: _____

Special requests on food etc.: _____

Preferred lab experiments (mark 3 of 4):

CIGS cells ; Dye-sensitized solar cells ; Photochemical H₂ ; Photobiological...

Address to which the invoice should be sent (2500 SEK, excl. VAT):

Supervisor signature: _____