

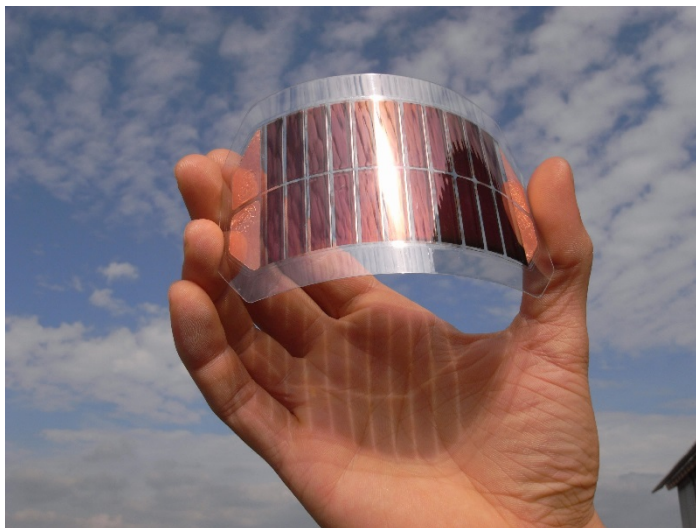
Master Thesis Proposal

Green polymer synthesis for solar cells

We are currently looking for highly motivated master students for 30- or 60 hp projects in polymer chemistry at applied chemistry!

Problem

There is a big need for renewable energy sources in order to solve the energy crisis. Inspired by Nobel Prize in physics in development of conducting polymers in 2000, polymer solar cells have stirred great interest due to the possibility of cheap and environmentally friendly energy. Their performances have increased several-fold over a decade and might soon be viable for large scale production.¹ A big problem is the ubiquitous use of chlorinated



solvents during manufacture. These are highly toxic both for humans and the environment and thus need to be substituted before large scale production.²

Proposed Solution

In order to solve this problem, our project aims to produce conjugated active layer materials, which can be processed with alcohol or water. Several ways to reach this goal are pursued and success would lead to a large step forward in preparing polymer solar cells suitable for mainstream use. The focus of the Master's thesis work will be to get involved in the synthesis and characterization of conjugated materials. You will develop your skill in organic synthesis and also have the chance to use the state of the art equipment such as NMR, MALDI-TOF, DSC, UV absorption, FTIR, TEM and others that are available in our department for characterization of the final materials and the intermediate compounds. This is a one-year project equivalent to 60 credits, however it may be adapted to a half-year project. If you are interested, please contact us for more information.

References:

- (1) Helgesen, M.; Søndergaard, R.; Krebs, FC. *Journal of Materials Chemistry*, **2010**, 20, 36-60
- (2) Chueh, CC; Yao, K; Yip, HL; Chang, CY; Xu, YX; Chen, KS; Li, CZ; Liu, P; Huang, F; Chen, YW; Chenb, WC; Jen, AKY. *Energy Environ. Sci.*, **2013**, 6, 11, 3241

What you can expect to learn:

- Cross-disciplinary research
- Organic Synthesis
- Polymer Chemistry
- Characterization techniques: NMR, MALDI-TOF, UV/VIS, TEM, GC-MS, and more

Industries in Gothenburg or nearby areas that are interested in these skills include Akzo Nobel, Borealis, Perstorp, AstraZeneca, Preem, Nynas, Volvo, SKF, INOVYN and many more!

About us:

The research under docent Ergang Wang is focused on organic electronics such as organic solar cells, field-effect transistors, light-emitting diodes and photodetectors. Kim Bini is working as PhD student and works with the presented topic: synthesizing conjugated polymers for solar cells with the aim of making water-/alcohol soluble polymers for a greener future!



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Take the chance to do research in an exciting field with a bright future!

References:

- (1) Helgesen, M.; Søndergaard, R.; Krebs, FC. *Journal of Materials Chemistry*, **2010**, 20, 36-60
- (2) Chueh, CC; Yao, K; Yip, HL; Chang, CY; Xu, YX; Chen, KS; Li, CZ; Liu, P; Huang, F; Chen, YW; Chenb, WC; Jen, AKY. *Energy Environ. Sci.*, **2013**, 6, 11, 3241