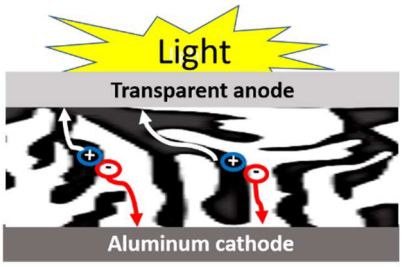
Master Thesis:

Manipulating nanostructures of materials-based organic solar cell

In the last decade, performance of organic solar cells (OSCs) has been steadily increasing, surpassing a power conversion efficiency (PCE) more than 15%. Moreover, OSCs are flexible in design and less costly compared to their rigid counterpart. Targeting at an improved efficiency of OSC, researchers are currently exploring two experimental routes; i) synthesizing new types of active materials, 2) optimizing the nanoscale morphology for enhanced charge transfer. Active organic layer which transfers light into charge carriers should meet some important structural criteria, facilitating the charge separation and thus resulting in an enhanced PCE. A master thesis is offered in my chair; which include preparation of materials-based solar cell for high performance organic photovoltaic devices by controlling material structure in solution, prior to the deposition step to a thin active organic layer. Manipulating nanoscale morphology of active materials and understanding the correlation between morphology and charge-transfer properties of the investigated materials is the main task of the master thesis. An essential part is the usage of advanced X-ray and neutron scattering techniques for the determination of structural length scales of the active materials in both solution and thin film format.



Tasks:

- Conducting a literature review,
- Preparing samples,
- Sample characterization using experimental techniques:
  - X-ray and neutron small angle scattering,
  - UV-Vis,
  - Scanning electron microscopy,
  - Photoluminescence spectroscopy
- Data evaluation and identifying structures and physical properties

Qualifications:

- Students of physics, chemistry, or materials science.
- Knowledge of a programming language such as Python is advantageous.

Contact:

- Prof. Dr. Tobias Unruh, tobias.unruh@fau.de
- Dr. habil. Ezzeldin Metwalli, ezzeldin.ali@fau.de

The thesis will be carried out at ICSP-Staudtstr 3, 91058 Erlangen and can be written in English or German.