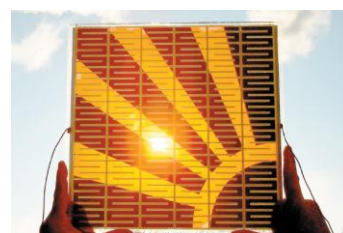
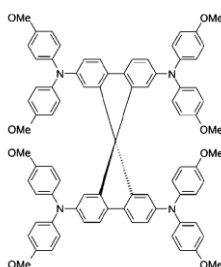


MASTER THESIS in Physics:

Hybrid Photovoltaics – Investigation of organic-inorganic and all-organic interfaces in solid state dye sensitized solar cells

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Dye sensitized solar cells (DSSC) are a promising alternative to conventional silicon solar cells. The active layer of a DSSC consists of a nanoporous titania film which is transparent in a wide spectral range and therefore usually sensitized with a monolayer of a ruthenium-based organic dye. The excitons created by light absorption in the dye are split very efficiently at the titania-dye interface and as titania is a n-type conductor, it is able to transport electrons to one electrode. The hole remaining at the dye has to be transported to the counter electrode in order to regenerate the dye molecule. One possibility for dye regeneration is the use of amorphous organic Hole Transport Materials (HTM) like spiro-MeOTAD.

As the properties of interfaces between different materials have a huge impact on device performance, it is crucial to understand and optimize these interfaces for devices with high power conversion efficiencies. In this work the all-organic interface between HTM and dye and the organic-inorganic interface between HTM and the metal counter-electrode will be investigated systematically under different chemical doping conditions for the HTM using photoelectron spectroscopy (XPS/UPS) in a state of the art UHV chamber. To observe the impact of these variations on complete devices, small solar cells will be produced and characterized under AM 1.5G illumination in an electrical semiconductor characterization setup.

What you should contribute:

- Interest and enthusiasm for scientific research
- Ability to work in a team including attendance in group meetings and institute seminars
- Experimental skills
- Profound knowledge in data analysis

