

# **Research group Dr. Frank Trixler**

LMU, Department of Earth and Environmental Sciences & Center for NanoScience (CeNS)

# **Bachelor- /Master Theses**

# Topic: Formation and Doping of Van-der-Waals Heterostructures via Organic Solid/Solid Wetting Deposition



Fig 1: Supramolecular nanowires of organic semiconductors on graphene produced by solid/solid wetting, imaged via scanning tunneling microscopy (STM). © F. Trixler



Fig. 2: STM image of a supramolecular nanowire assembled from organic semiconductor molecules. Superimposed is our computer simulation of the supramolecular structure and a simulated molecular orbital of the used organic semiconductor QAC (gray). © F. Trixler

#### Background

Our nanoscience based research focuses on the development of simple, cost-effective and environmentally friendly processes for the production of organic electronics. We have developed a process that we term "organic solid/solid wetting deposition". The process produces one- and two-dimensional organic semiconductor nanostructures on crystal surfaces directly from three-dimensional particles. The process takes place under ambient conditions through a network of nanofluidic effects in aqueous suspensions of nanoparticles.

#### Project

The aim is to generate organic semiconductor nanostructures on hBN/graphene Van-der-Waals heterocrystals. Nanofluidic effects that can be catalyzed by biomolecules such as AMP (an RNA building block) are used to generate the organic semiconductor nanostructures. The project focuses on the formation and investigation of the formed nanostructures using microscopic and spectroscopic methods.

The exact project definition and design is agreed with the applicants in order to be able to respond to their personal interests, aptitudes and plans.

## Techniques used

- Scanning Tunnelling Microscopy with atomic resolution (STM)
- Tunneling Spectroscopy (TS)
- Raman Spectroscopy

## Requirements

- Interest in organic semiconductor nanotechnology, materials science and the development of environmentally friendly, energy-saving and sustainable manufacturing processes.
- Enjoy interdisciplinary research

#### Applications

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