

A nanoprobe-electron microscopy approach for the study of supramolecular polymers and spin polarized tunneling junctions.

The project aims to develop and assemble a nanoprobe station equipped with micro nanomanipulator combined with a scanning electron microscope (SEM). This project represents a part of the “NanoteraHertz” collaboration between IS2M Mulhouse, IPCMS-Strasbourg, IJL-Nancy and the Albert-Ludwig University-Freiburg, financially supported by the Grand-Est region. More specifically, the project concerns the realization and study of supramolecular and polymeric assemblies of semi-conductors with high charge carrier mobility, resulting from in-situ crystal growth or prepared by electrospray-deposition under UHV conditions or ex-situ depositing methods like spin-/dip coating. Morphological and spectroscopic studies will be performed by STM/AFM under UHV.

The central goal is: Studying transport of charges on conjugated polymers such as polydiacetylene (individual molecules and organized assemblies in 2D and 3D) and on the crystals of supramolecular polymers. Novel crystalline structures should be realized by manipulating these ordered structures at the nanometer scale. We aim to perform transport/mobility measurements (using appropriate electrodes for charge collection) as a function of the degree of crystallinity, to identify the influence of defects (distortion of order) on single crystals and to measure the changes caused by local illumination with visible light using a precisely positioned optical fiber. An anticipated correlation between transport of excitons and electrons will be examined. STM experiments and realization of ordered layers and supramolecular assemblies will be performed in Freiburg. Transport measurements and the development of micro and nanomanipulators will be realized in Mulhouse (IS2M). The co-supervised thesis will be part of a longstanding collaboration between the two universities.

Contacts:

- Prof. Günter Reiter guenter.reiter@physik.uni-freiburg.de (Albert Ludwig Univ. Freiburg/Germany)
- Dr. Laurent Simon Laurent.simon@uha.fr (University of Haute Alsace UHA-IS2M-Muhlouse/France)