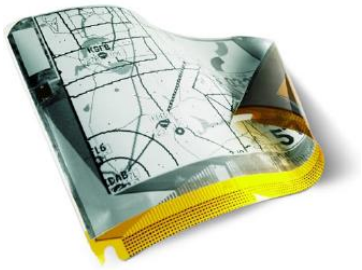
Institute of Physics (IA)
Organic Group

MASTER THESIS in Physics:

Organic Interfaces - Bonding Behavior of Self-Assembled Monolayers on Dielectric Surfaces



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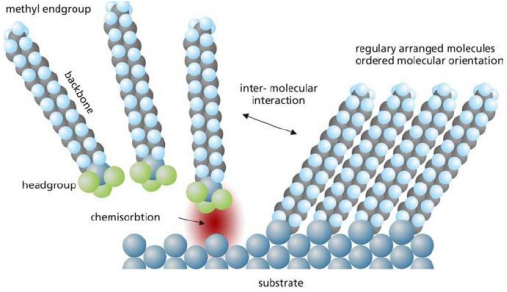
Organic thin film transistors (OTFT) present a novel and promising approach to facilitate a mechanically flexible active matrix for electronic applications. These will allow for the fabrication of large area displays on bendable foil based on organic layers. However, there are still challenges to improve the performance of OTFTs. In particular, the interface properties between charge transport layer and the insulating dielectric has huge impact on device performance. An effective approach to tune the characteristics of this interface is the modification of the dielectric surface with self-asssembled monolayers (SAM) of specially designed organic molecules. These molecules consist of a substrate-bonding head-group and an end-group that possesses a different surface free energy and/or surface dipole moment than the substrate which influences film formation of organic materials deposited onto this surface as well as density and distribution of trap states for charge carriers at this interface.

In this work, different newly designed derivates of octadecyltrichlorosilane (OTS), a widely used molecule for SAMs, will be deposited on silicon dioxide surfaces and investigated with advanced experimental techniques like fourier transformed infrared spectroscopy (FTIR) and photoelectron spectroscopy (XPS/UPS) as well as the theoretical method of density functional theory (DFT). The combination of this methods and the comparison to already measured trends in complete OTFT devices will enhance our current understanding of the relevant physical processes so that we will be able to design SAM molecules with the best achievable properties.

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



More information on organic thin-film applications and the work of out group can be found:
http://www.physik.rwth-aachen.de/institute/institut-ia/forschung/organische-schichten/publikationen/