Basics of high mobility small molecule semiconductors

In the group of Prof. Karl Leo, we are currently starting a large project on highly ordered organic semiconductors funded by the DFG within the prestigious “Reinhart Koselleck” program. The goal is based on recent work [1,2] which demonstrates that highly ordered thin films (Fig. 1) of organic semiconductors can be grown even in multilayer structures and with doped films. This open exciting new possibilities for high-performance flexible devices like displays, solar cells, biocompatible electronics, and more.

Here, we search for Master thesis candidates with a solid background in physics, electronics or related topics. We offer both topics addressing basic research and more device related work. You will work in a small team together with PhD candidates supporting you.

Interested? Please contact Prof. Karl Leo karl.leo@tu-dresden.de and (0351) 463-37533

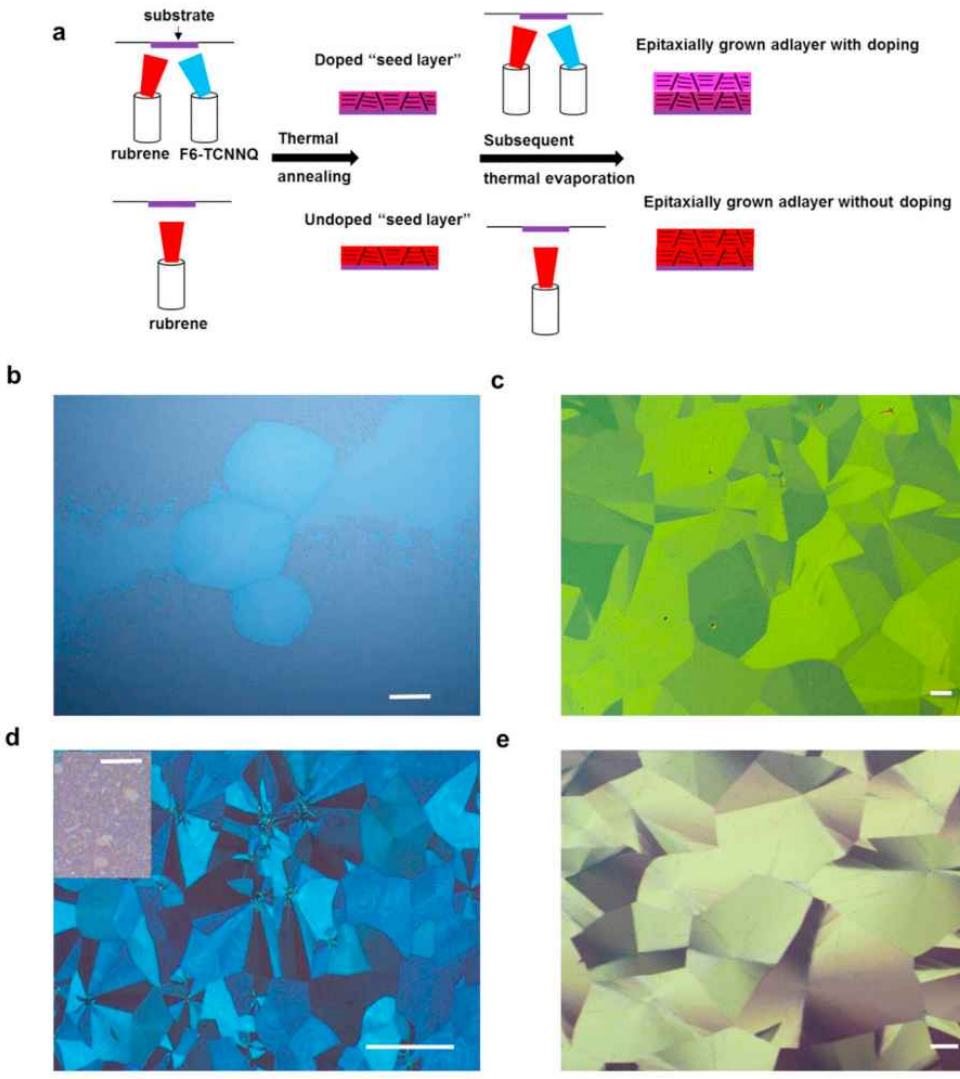

Fig. 1. (a) Schematic drawing of the seed layer preparation, doping and epitaxial adlayer deposition. Crystallized rubrene thin-films (40 nm) on (b) SiO_2 (300 nm) coated Si substrate annealed for 3 min at 160 °C. (c) TAPC (5 nm)/SiO_2 (300 nm) coated Si substrate annealed for 4 min at 160 °C. (d) TAPC (5 nm)/Ag (20 nm)/Glass annealed for 4 min at 160 °C. The inset shows the crystal formed on Ag surface with TAPC underlayer annealed for 4 min at 160 °C. (e) TAPC (5 nm)/ITO (100 nm)/Glass annealed for 4 min at 160 °C. The scale bars correspond to 100 μm.

Figure 1: a) growth principle and b)-e) microscopy images of highly ordered layers.

References:
[1] M. Sawatzki, H. Kleemann, B. Boroujeni, S.-J. Wang, J. Vahland, F. Ellinger and K. Leo, “Doped Highly Crystalline Organic Films: Toward High-Performance Organic Electronics”, Adv. Sci., 2003519 (2021)

[2] S.-J. Wang, M. Sawatzki, H. Kleemann, I. Lashkov, D. Wolf, A. Lubk, F. Talnack, S. Mannsfeld, Y. Krupskaya, B. Büchner, and K. Leo, “Vacuum processed large area doped thin-film crystals: A new approach for high-performance organic electronics”, Materials Today Physics 17, 100352 (2021)