# Charge Transport Physics of High Mobility Conjugated Polymers

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Over recent years several new classes of conjugated polymer semiconductors have shown promise as materials for polymer field-effect transistors. Many of these recently discovered high mobility polymers, in particular donor-acceptor copolymers, are characterised by a puzzling lack of pronounced crystalline order. In this presentation we will present our current understanding of the transport physics of these materials, of the reasons why they exhibit such high carrier mobilities and discuss approaches for improving their device reliability and threshold voltage stability for applications that have demanding mobility, but also stability requirements, such as active-matrix addressing of liquid crystal and OLED displays.

# Exciting! Ultrafast dynamics in ZnO, at its surfaces, and interfaces with organic molecules after light absorption

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The functionality of hybrid inorganic/organic systems (HIOS) is governed by (i) the static interfacial electronic properties and, consequently, the resulting energy level alignment, and (ii) the resulting charge and energy transfer rates (CT/ET). Both are investigated by a combination of complementary fs time-resolved techniques: two-photon photoelectron spectroscopy (tr-2PPE), transient excited state transmission (tr-EST), photoluminescence spectroscopy (tr-PL), and time-resolved electronic sum frequency generation (tr-eSFG) [1]. These tell us about how the ultrafast exciton dynamics in bulk ZnO are dominated by trapping at defect sites, how surface potential modifications by hydrogen adsorption lead to

highly stable surface excitons at oxygen- and mixed-terminated ZnO surfaces [2,3], how (de)localization of excitons in organic dyes can alter their probability for CT and ET [4], how triplet-triplet annihilation can result in self ionization, and, if time allows, how interfacial hybrid states can be involved in charge transfer excitations.

[1] L. Foglia, M. Wolf, J. Stähler, Appl. Phys. Lett., submitted

[2] J.-C. Deinert et al., Phys. Rev. B 91, 2353131 (2015)
[3] J.-C. Deinert et al., Phys. Rev. Lett. 113, 057602 (2014)

[4] L. Foglia et al. Chem. Phys. Lett. 646, 25 (2016)