



## **Doping of Organic Semiconductors**

Karl Leo

*TU Dresden, Germany*

Organic semiconductors with conjugated electron systems are currently intensively investigated for many novel electronic and optoelectronic applications. Their key advantages are flexibility, low cost, and low resource usage since the mostly carbon-based materials are realized as nano-meter scale thin film devices. Controlled electrical doping<sup>1/</sup> is a key technology for efficient OLEDs and hence broadly commercially used, despite the fact that the microscopic mechanisms are controversially discussed. In this talk, I will summarize recent research findings on controlled molecular doping. The detailed understanding of doping effects and Fermi level control has turned out to be difficult. A particular challenge is that doping can be very efficient despite the fact that the Coulomb binding energy between carrier and dopant seems much too large to allow efficient release. Recently, we have shown that the basic mechanisms of doping in organics can be explained by including defects and disorder into the description<sup>2/</sup>. Finally, I will briefly review novel applications of doping in sensors and transistors.

<sup>1/</sup>K. Walzer et al., Chem. Rev.107, 1233(2007)

<sup>2/</sup>M. Tietze et al., Adv. Funct. Mat. 25,2701 (2015), M. Tietze et al., Nature Comm. 2018 (in press)