

Organic Electronics – from Basic Science to Real World Applications

Björn Lüssem

Institut für Angewandte Photophysik, Technische Universität Dresden, 01062 Dresden, Germany

Organic electronics is a fascinating field of research combining fundamental physics with strong applications. Organic light emitting diodes (OLEDs) are currently used in the latest generation of small displays, organic solar cells have reached efficiencies beyond 10%, and organic transistors are being discussed as potential candidates for low-cost, flexible electronics.

In this presentation, I will discuss strategies to design highly efficient OLEDs. It will be shown that a detailed understanding of the doping technology developed at the Institute of Applied Photophysics (IAPP) [1,2] and a thorough electrical and optical modeling of the OLED enables the design of OLEDs with highest efficiency [3].

Besides its use in OLEDs, organic doping will become a key technology in the field of organic transistors, which offers unprecedented control on device characteristic and allows for the design of novel organic transistors. I will discuss the first realization of organic inversion transistors [4]. Furthermore, vertical transistors showing higher driving currents and transconductance than conventional organic transistors are presented [5,6].

[1] B. Lüssem, M. Riede, K. Leo, *Physica Status Solidi A*, 2013, 210, 9.

[2] M. Tietze, L. Burtone, M. Riede, B. Lüssem, K. Leo, *Physical Review B*, 2012, 86, 035320

[3] S. Reineke, F. Lindner, G. Schwartz, N. Seidler, K. Walzer, B. Lüssem, K. Leo, *Nature*, 2009, 459, 234.

[4] B. Lüssem, M. Tietze, H. Kleemann, C. Hoßbach, A. Zakhidov, K. Leo, in preparation

[5] A. Fischer, R. Scholz, K. Leo, B. Lüssem, *Applied Physics Letters* 2012, 101, 213303

[6] H. Kleemann, K. Leo, B. Lüssem, *Small*, 2013, accepted