

Organic semiconductors: Physics and device applications

Karl Leo

Institut für Angewandte Photophysik, Technische Universität Dresden,
01062 Dresden, Germany, www.iapp.de

Organic semiconductors with conjugated electron system are currently investigated intensively, both because the basic physics are little understood and because of attractive application possibilities, such as flat-panel displays based on organic light emitting diodes (OLED). I will first give a brief overview about the characteristics of this new class of semiconductors.

I will then discuss results of a comprehensive study of controlled n- and p-type doping of various molecular organic materials. In contrast to classical silicon technology where controlled n- and p-type doping has always been a standard technique, the organic materials are usually prepared in a nominally undoped form.

We have further shown that these electrical doping concepts can be successfully applied in devices: the concept of molecular doping allows to realize OLED devices with the highest efficiencies reported so far, exceeding the efficiency of GaN devices.