Mesogens with modified perylene cores as emitter materials in organic light emitting devices

J. Vollbrecht,1,* H. Bock2 and H. Kitzerow1

1 Center for Optoelectronics and Photonics Paderborn, University of Paderborn, Paderborn, Germany
2 Centre de Recherche Paul Pascal, Université Bordeaux, Bordeaux, France

Organic electronics has been a hot topic of research in the recent years. Especially creating displays on a flexible substrate with high energy conversion, chemical stability, brilliance, low production costs and a wide viewing angle is a goal that can only be reached by investigating new classes of organic semiconductors. Calamitic and discotic liquid crystals with semiconducting properties exhibit huge potential in enhancing the performance of organic light emitting devices owing to the self-organizing properties of liquid crystals.[1]

In this study, perylene compounds and derivatives with modified perylene cores and their potential for the fabrication of light emitting devices were compared. A unilaterally extended (2), a coronene (3) and a bilaterally extended (4) perylene were investigated.[2-4]

Chemical structure of imides and esters with a perylene- (1), phenanthro[1,2,3,4,ghi]perylene- (2), coronene- (3) and dinaphtho[1,2-a:1',2'-j]coronene- core (4).

The liquid crystalline properties of the compounds were studied. In addition organic light emitting diodes (OLED) were assembled and their electroluminescence, current-voltage- and luminance-voltage characteristics were measured. To improve performance, multiple layers of different organic semiconductors and doping of layers were considered, taking into account the energies of the highest occupied molecular orbital (HOMO), the lowest unoccupied molecular orbital (LUMO) and band gaps of the compounds.

References:

* presenting author; E-mail: Joachim.Vollbrecht@upb.de