

Organic thin film transistors based on π -conjugated semiconductors

Yunqi Liu, Chongan Di, Wei Xu, Gui Yu, Wenping Hu and Daoben Zhu
Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China
Email: liuyq@iccas.ac.cn

During the past ten years, organic thin film transistors (OTFTs) have attracted much attention as low-cost alternatives to conventional silicon-based transistors for electronic applications. Considerable effort has been made on both the synthesis of high-performance π -conjugated semiconductors and the fabrication methods of OTFTs. The building blocks for these π -conjugated semiconductors involve benzene, thiophene, carbazole, perylene, triphenylamine, etc. A series of novel π -conjugated molecules were designed in the hope to get high performances via a combination of these building blocks based on some guidelines although they are in debate. The general accepted guidelines for high performances molecules are such that they are extended π -conjugated system with planar structure and easy to crystallization. OTFTs were fabricated and electronic properties were investigated. Therefore, the relationship between the chemical structure, condensed structure and physical properties were explored.

In this presentation, we will report several π -conjugated molecules [1–5], including fused thiophenes, ladder-type pentacene-like oligomers, linear benzene-fused bis(tetrathiavalene), cyclic triphenylamine dimmer, and perylene bisimides. These molecules were employed in OTFTs as active semiconductors, showing high mobilities, current on/off ratios and stabilities.

*This work was supported by the Organizing Committee.

- [1] Kai Xiao, *et al.*, J. Am. Chem. Soc., 127 (2005) 13281.
- [2] Yabin Song, *et al.*, J. Am. Chem. Soc., 128 (2006) 15940.
- [3] Xike Gao, *et al.*, Adv. Mater., 19 (2007), 3037.
- [4] Yunlong Guo, *et al.*, Adv. Mater., 20 (2008), 4835.
- [5] Ying Liu, *et al.*, Adv. Funct. Mater., 19 (2009), 772.