

High Band Gap Indacenodithiophene and Indacenodithienothiophene Copolymers as Electron Donors in Organic Photovoltaics

Athanasios Katsouras, Christos L. Chochos and Apostolos Avgeropoulos
*Department of Materials Science and Engineering, University of Ioannina, Ioannina
45110, Greece*

Conjugated polymers represent one of the most important class of materials for the fabrication of many optoelectronic applications, such as light emitting diodes, field effect transistors, organic photovoltaics, sensors, etc. In the field of organic photovoltaics, the design of novel conjugated polymers with appropriate frontier orbital energy levels, optical band gap and suitable carrier transport properties are needed to improve the power conversion efficiency (PCE).^[1,2] Among various materials developed for bulk heterojunction devices, the multifused-ring conjugated polymers are particularly interesting due to their superior optical and electrical properties.^[3] The highly fused aromatic/heteroaromatic units enhance effective conjugation of the polymer backbone to facilitate electron delocalization and charge carrier mobilities.^[4] In this work, we present the design, synthesis and optoelectronic (absorption and electrochemical properties) characterization of a new family of Indacenodithiophene and Indacenodithienothiophene based copolymers. Finally, initial results on the performance of these copolymers in organic photovoltaic devices will be demonstrated.

Figure 1: Chemical structures of the indacenodithiophene and indacenodithienothiophene copolymers developed in this work

References

- [1] G. Li, R. Zhu, Y. Yang *Nature Photon.* **6**, 153 (2012).
- [2] C. L. Chochos, S. A. Choulis, *Prog. Polym. Sci.* **36**, 1326 (2011).
- [3] J. You, L. Dou, Z. Hong, G. Li, Y. Yang, *Prog. Polym. Sci.* **38**, 1909 (2013).
- [4] Y. Li, K. Yao, H.-L. Yip, F.-Z. Ding, Y.-X. Xu, X. Li, Y. Chen, A. K.-Y. Jen *Adv. Funct. Mater.* (2014), DOI: 10.1002/adfm.201303953