

Tuning the Electronic Properties of the Fully Planar Indolo[3,2,1-*jk*]carbazole Scaffold *via* Incorporation of Electron Rich Thiophene

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Triphenylamines are an important class of donor building blocks in the field of organic electronics.[1],[2] Crucial electronic properties such as triplet energy (E_T), HOMO/LUMO levels and donor strength can be tuned *via* modifications of its molecular structure e.g. planarization. Specifically, the donor strength decreases with increased planarization, with the completely planar indolo[3,2,1-*jk*]carbazole (ICz, Figure 1) even exhibiting weak acceptor characteristics.[3]

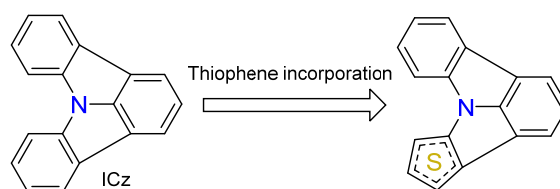


Figure 1: Schematic representation of the incorporation of thiophene into the ICz scaffold.

In this contribution an increase in donor strength of the building block, while retaining full planarity, is presented. This is achieved by the incorporation of electron rich thiophene into the scaffold. Furthermore, a fine tuning of the electronic properties depending on the substitution positions is realized. A synthetic approach towards the target molecules employing Ullmann condensation as well as CH activation will be presented. Furthermore, the electrochemical as well as photophysical characterizations of the novel building blocks will be discussed.

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- [1] Y. Shirota and H. Kageyama, "Charge Carrier Transporting Molecular Materials and Their Applications in Devices," *Chem. Rev.*, vol. 107, no. 4, pp. 953–1010, Apr. 2007.
- [2] Y. Tao, C. Yang, and J. Qin, "Organic host materials for phosphorescent organic light-emitting diodes," *Chemical Society Reviews*, vol. 40, no. 5, p. 2943, 2011.
- [3] P. Kautny et al., "Oxadiazole based bipolar host materials employing planarized triarylamine donors for RGB PHOLEDs with low efficiency roll-off," *Journal of Materials Chemistry C*, vol. 2, no. 11, p. 2069, 2014.