SYNTHESIS AND CHARACTERIZATION OF NON-PLANAR TETRAAZAPEROPYRENES (TAPPS) VIA BAY-SUBSTITUTION

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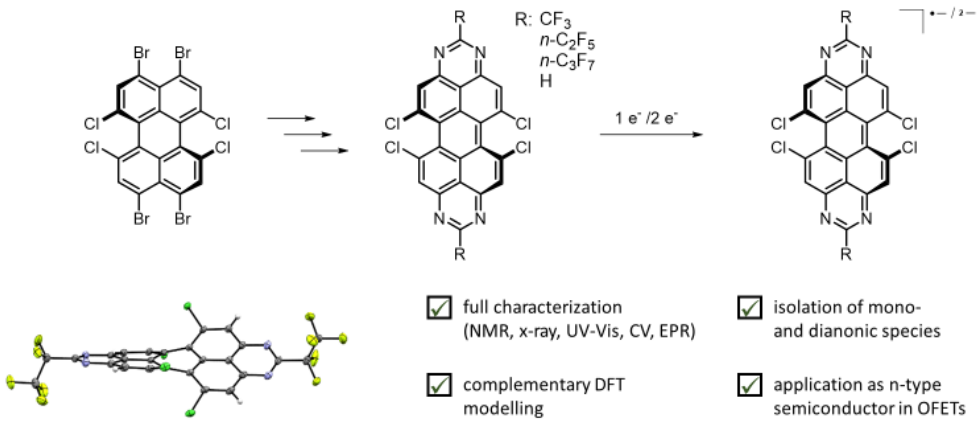
To this day, the research field of organic electronics is hampered due to the ongoing problematics in the fabrication of n-type semiconductors and their stability under ambient conditions.[1] Amongst different approaches facing this problem, the class of Tetraazaperopyrenes (TAPPs) has proven to circumvent many of these issues, however, has been limited in its variability as only the ortho-position could be functionalized. [2] In this context, we present an alternative TAPP-synthesis that enabled the isolation of a series of bay-chlorinated TAPPs. A detailed study revealed that the introduction of chloride substituents at this position not only leads to a stabilization of the LUMO levels and an increase of the electron affinity but also to an unprecedented twist of the peropyrene core of ca. 30°. Despite their non-planarity, the herein investigated TAPPs could be employed as n-type semiconductors in organic field effect transistors (OFETs) exhibiting electron mobilities of 1-3x10^{-3} $cm^2V^{-1}s^{-1}$. The mono- and dianionic reduced species were isolated and characterized by UV-Vis spectroscopy and EPR or NMR, respectively. Finally, a comparison of bay-and ortho-chlorinated TAPPs was conducted to further elaborate the influence of the different substitution patterns.



[1] Y. Zhao, Y. Guo, and Y. Liu, *Adv. Mater*. **2013**, *25*, 5372–5391.

[2] S. C. Martens, U. Zschieschang, H. Wadepohl, H. Klauk, L. H. Gade, *Chem. Eur. J.* **2012**, *18*, 3498–3509; S. Geib, U. Zschieschang, M. Gsänger, M. Stolte, F. Würthner, H. Wadepohl, H. Klauk, L. H. Gade, *Adv. Funct. Mater.* **2013**, *23*, 3866–3874.