Synthesis and characterization of selenophene/thiophene mixed organic semiconductors

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Thiophene-based small molecules proved to be benchmark p-type organic semiconductors owing to their unique electronic properties associated with their π-electron topology [1]. Recently, several promising organic semiconductors based on benzothieno[3,2-*b*]thiophene **1a** [2] and benzothieno[2,3-*b*]thiophene subunits **2a** [3, 4] yielding high charge carrier mobilities have been investigated. The introduction of electron donating, and highly polarizable selenium may even enhance charge carrier mobilities. However, the development of reliable synthetic pathways toward selenium-based materials is still matter of ongoing research owing to a lack of available starting materials.

Based on the structural moieties **1a** and **2a** (Figure 1), the topic of this contribution focusses on the integration of selenium in these fused π-conjugated compounds leading to semiconductors **1b-1d** and **2b-2d**.

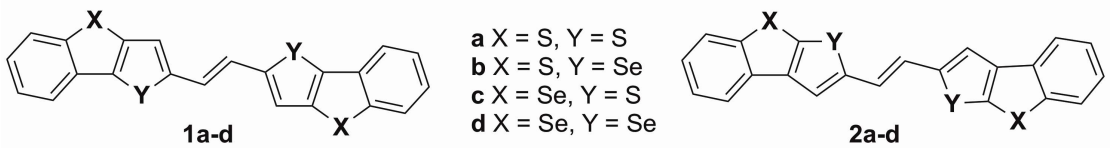

Figure 1: Mixed thiophene/selenophene fused target compounds.

Reliable protocols towards regioisomeric selenophene-based fused acenes will be presented starting from commercially available small building blocks. The photo-physical and electro-chemical properties of these target materials will be presented.

[1] Q. Meng, et al., J. Mater. Chem. 21, 11708 (2011).

[2] H. Chen, et al., J. Phys. Chem. C 115, 23984 (2011).

[3] T. Mathis, et al., J. Appl. Phys. 115, 043707 (2014).

[4] Y. Liu et al., J. Mater. Chem. C 2, 8804 (2014).