New synthesis of benzo[1,2-b:4,5-b′]dithiophene (BDT)

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Thiophene-containing polycondensed aromatic compounds are important source of functional organic materials for different applications. Within this class of molecules, benzo[1,2-b:4,5-b′]dithiophene (**BDT**, figure 1) is recognized as one of the most successful building blocks in the synthesis of highly efficient photovoltaic and semiconducting materials.[1] In fact the rigid and planar conjugated structure of **BDT** makes it attractive for achieving highly tunable molecular energy levels and optical band gaps as well as high hole mobilities. In recent years, benzannulation and thieannulation approaches, involving several steps, have been applied to the synthesis of **BDT** and of π-extended thienoacenes,[2] but the search of alternative easy access to this class of heterocycles is always a valuable synthetic target.
We present here a new two-step synthesis of **BDT**, starting from 3-thiophene carbaldehyde as unique thiophene precursor.

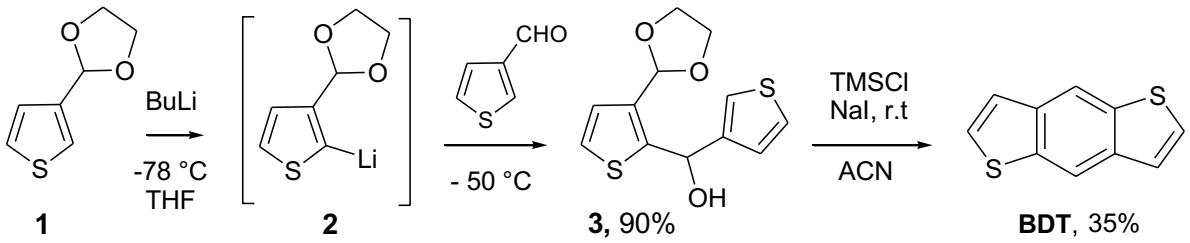

Figure 1

Although the second step of the synthesis needs to be optimized, this new methodology is certainly competitive to the classical approach[3] which involves four steps, more expensive reagents and gives a comparable overall yield.
In addition, the use of different hetero/aromatic aldehydes in the reaction with intermediate **2** gives access to a series of thiophene benzocondensed heterocycles.

References:

[1] J. Hou, H. Yao *et al., Chem. Rev.* **2016***, 116,* 7397−7457.
[2] K. Takimiya, I. Osaka *et al*., *Eur. J. Org. Chem.* **2013**, 217-227.
[3] G. Kossmehl, P. Beimling, *Chem. Ber.* **1986,** *119*, 3198-3203.