One-Pot Synthesis of Thiepin-Fused Heteroacenes

Significance: Polycyclic aromatic hydrocarbons with heteroatom substitution are attractive materials for semiconductor applications. The authors present the efficient installation of a thiepin unit onto easily accessible DIDT (C.-H. Chen, Y.-J. Cheng, M. Dubosc, C.-H. Hsieh, C.-C. Chu, C.-S. Hsu Chem. Asian J. 2010, 5, 2483). In this one-pot synthesis, DIDT was deprotonated with potassium tert-butoxide, reacted with carbon disulfide, and quenched with methyl iodide or hexyl bromide. The fused thiepins were obtained in 90% and 80% yield.

Comment: HOMO and LUMO energies were determined by cyclic voltammetry (~-5.35 eV and ~-3.26 eV, respectively, regardless of the alkyl chain). Both compounds exhibited typical p-type semiconducting behavior with hole mobilities up to 1.0 x 10^-2 cm^2 V^-1 s^-1. Thin films were further characterized by AFM and XRD. Crystal structures were obtained for both compounds and showed multiple S=S contacts.