



Quaterthiophenes with Terminal Indeno[1,2-b]thiophene Units as p-Type Organic Semiconductors

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Résumé en anglais	<p>Quaterthiophenes 4T, Oct-4T, and Tol-4T based on a central 2,2'-bithiophene core α,ω-terminated with 4,4-unsubstituted and 4,4-disubstituted n-octyl or p-tolyl indeno[1,2-b]thiophene have been synthesized by Stille or Miyaura–Suzuki couplings. Compound 4T was also synthesized by an alternative route involving a soluble precursor bearing solubilizing trimethylsilyl groups which have been eliminated in the last step. The electronic properties of the compounds have been analyzed by cyclic voltammetry, UV–vis absorption and fluorescence emission spectroscopy. Thermal evaporation of 4T and Oct-4T leads to crystalline thin films and UV–vis absorption and X-ray diffraction data for these films suggest that the molecules adopt a quasi-vertical orientation onto the substrate. Strong π-π intermolecular interactions have been observed for 4T but not for molecules Oct-4T due to the presence of n-octyl chains. Sublimed thin films of Tol-4T show an amorphous character. The characterization of field-effect transistors fabricated from these three materials gave a hole-mobility of $2.2 \times 10^{-2} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$ with an on/off ratio of 2.2×10^4 for 4T while no field-effect was observed for Oct-4T and Tol-4T.</p>
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