

Low Bandgap Bistetracene-Based Organic Semiconductors Exhibiting Air Stability, High Aromaticity and Mobility

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Publication date

2017/4/11

Journal

Chemistry–A European Journal

Volume

23

Issue

21

Pages

5076-5080

Description

The benchmark of soluble organic semiconductors based on acenes is the 6,13-bis(triisopropylsilylethynyl)pentacene (**TIPS-PEN**). However **TIPS-PEN** still suffers from photoinduced oxidation due to its low degree of aromaticity. Increasing the aromaticity while keeping similar optical and electrochemical properties as well as a shape suitable for good hole transport can be achieved with two-dimensional polycyclic aromatic hydrocarbons (2D-PAHs). Herein, we present an efficient synthesis and characterization of bistetracene derivatives that exhibit a band gap up to 1.71 eV and an increased stability up to 21 times compared to **TIPS-PEN** and mobility over $0.1 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$ in solution-processed organic field-effect transistors. Based on simple structural consideration, the high stability is attributed to the aromaticity of the bistetracene which is comparable to an anthracene along each tetracene. According to ...