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Communication

Synthesis and red electroluminescence of a dimesityl-functionalized bistetracene

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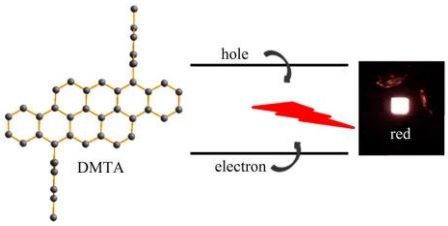
Graphical Abstract



The single crystal analysis of the as-prepared 8,16-dimesityltetraceno[2,1,12,11-opqra]tetracene (DMTA) suggests that the parent bistetracene backbone is almost in a plane without any intermolecular π-stacking interaction. The fabricated devices based on DMTA as an emitter exhibit a maximum brightness of 632 cd/m^2 at 14.7 V with the CIE coordinate of (0.623, 0.349).

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ABSTRACT

A novel dimesityl-decorated bistetracene derivative 8,16-dimesityltetraceno[2,1,12,11-opqra]tetracene (DMTA) has been synthesized and characterized. Its single crystal analysis demonstrates that the parent bistetracene backbone is almost in a plane without any intermolecular π-stacking interaction. DMTA exhibited the low-energy absorption at 560/607 nm and emission spectra at 617/663 nm, respectively. The fabricated device based on DMTA doping into 2,6-bis(3-(9*H*-carbazol-9-yl)phenyl)pyridine (1%) as an emitter present a maximum brightness of 632 cd/m^2 at 14.7 V with the CIE coordinate of (0.623, 0.349).

Polycyclic aromatic hydrocarbons, defined as organic compounds containing only carbon and hydrogen that are composed of multiple aromatic rings, have received a long-term attention due to their fascinating optoelectronic properties and promising application for organic devices [1-6]. Moreover, some of them could self-assembly into aggregation with controllable size and magnitude to envisage various scientific and technological applications in nanoscale level [7-10]. Polyacenes, usually refering to the linearly fused benzene units together, have great excitement for the unique electronic structure, which were utilized as alternatives in organic light-emitting diodes (OLEDs), organic field effect transistors (OFETs), solar cell, photocatalysts lasers [11,12]. For example, Chow has prepared the platelet-shaped hexacene crystals through physical vapour-transport method, where the molecules are formed herringbone array. The hole mobility of the organic field effect transistor made with single crystal can approach to 4.28 cm^2 V^{-1} s^{-1} [13]. In the group of Wudl, Zhang and Xiao, a family of twistacenes and their derivatives were achieved that emitted fluorescence covered with all visible region, which were selected as alternatives in electroluminescent devices [14-21].

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