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**Tandem Deep-Blue Phosphorescent OLED with High Blue Index Employing a Pt(II) Emitter**

Guijie Li\*

College of Chemical Engineering, State Key Laboratory Breeding Base of Green-Chemical Synthesis Technology, Zhejiang University of Technology, Hangzhou, Zhejiang 310014, P. R. China  
Corresponding author. Email: guijieli@zjut.edu.cn

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Organic light-emitting diodes (OLEDs) are advanced technology, and deep-blue OLED with Commission International de l'Éclairage (CIE) y coordinate ( $CIE_y$ ) less than 0.10 are essential for their applications in full-color displays. However, it is great challenge to develop high-performance deep-blue OLEDs to satisfy the requirement, especially for BT.2020 with  $CIE_y = 0.046$ , and advanced emitters are critical to solve the issue.

Typically, square-planar Pt(II) complexes consisting of bidentate or tridentate ligands typically suffer from low quantum efficiencies or poor chemical and thermal stabilities because of flexible molecular geometries or monoanionic ligands. By comparison, tetradentate Pt(II) complexes can afford rigid molecular geometries and exhibit high quantum efficiencies, short excited-state lifetimes and good chemical and thermal stabilities. The structure-property relationship<sup>1,2</sup>, especially the effect of molecular structure on the excited-state property, is an essential research topic, which can facilitate the further development of robust Pt(II) emitters. Tetradentate Pt(II) complexes can also be easily modified to adjust their photophysical properties, enabling the emission spectra to cover the whole visible region with high color purities, especially for high-performance deep-blue OLEDs.<sup>3-9</sup>

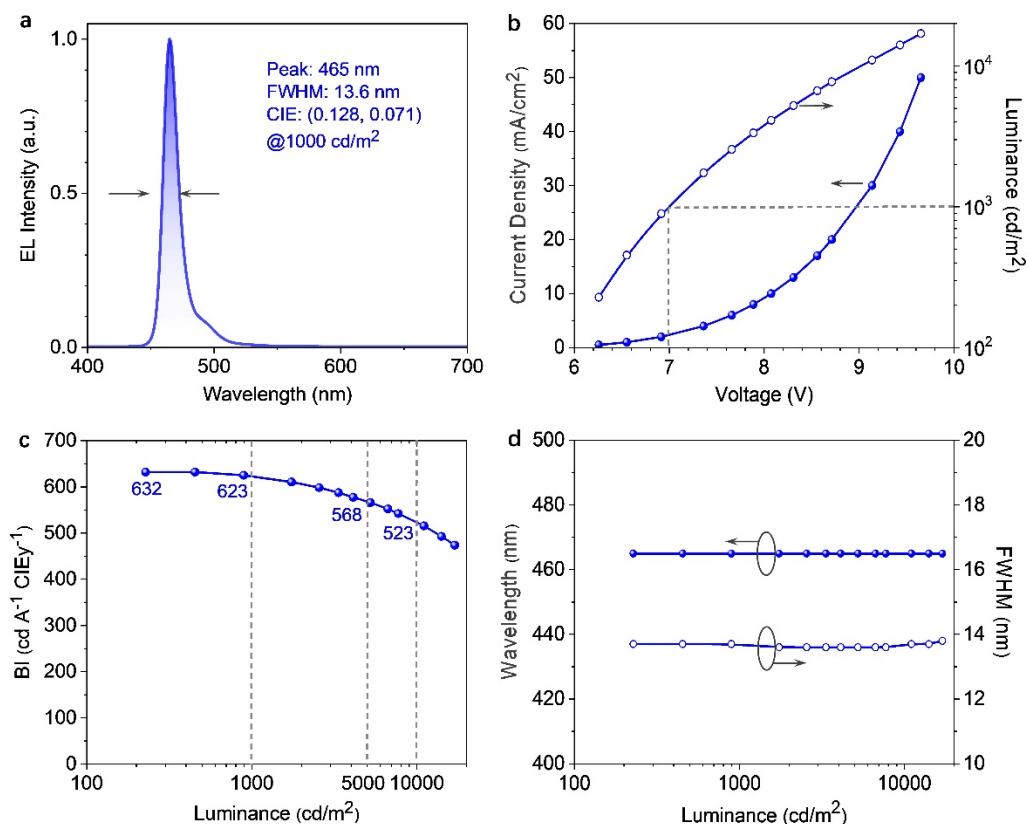


Fig. 1. Two-stack tandem top-emitting OLED performance.

Here, a robust Pt(II) emitter was designed and synthesized, which could act as emitter for high efficient and color purity deep-blue phosphorescent OLEDs. The Pt(II) emitter-doped two-stack tandem top-emitting OLED exhibited deep-blue emission with a peak at 465 nm and a full-width at half-maximum (FWHM) value of 13.6 nm, resulting in a  $CIE_y$  value of 0.071 (Fig. 1a). The deep-blue OLED showed a voltage of about 7.0 V at a luminance of 1000 cd/m² (Fig. 1b). A high maximum blue index (BI) of 632 cd A<sup>-1</sup> CIE<sub>y</sub><sup>-1</sup> was achieved, which could maintain 623, 568, and 523 cd A<sup>-1</sup> CIE<sub>y</sub><sup>-1</sup> at 1000, 5000, and 10000 cd/m² (Fig. 1c).

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Additionally, the OLED also had good stability for the emitting color (Fig. 1d). This work might provide a valuable reference for the further design and development robust Pt(II) phosphorescent emitters for potentially commercial application.

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