

**Title: High-performance organic light-emitting diodes and their novel applications**

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**Abstract:**

Owing to the advantages of color tuning by the molecular design of versatile elements, easy fabrication, flexibility and large size and environmentally friendliness, organic light-emitting diodes (OLEDs) have been extensively studied due to their great potential in flat-panel displays and as a solid-state lighting source. Efficiency, stability, and blue emission are key issues governing the future of OLEDs.

The reports introduce two mechanisms of exciton formation and emission in OLEDs. Next, we present some approaches to enhancing device efficiency by Ir-complex doped carrier transport layer, developing deep or pure blue OLEDs basing on novel blue emitters, and achieving color-stability white OLEDs using color conversion method or Pt-4-based excimer emission.

Finally, we have studied their novel application in high color rendering index (CRI>90) devices with sun-like emission, plant lighting sources, as well as OLED-pumped organic semiconductor laser.