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Highly efficient blue OLED

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Based on our work on deep blue OLED [1-3], very recently, we have synthesized a deep blue emitter TPEA that combines the advantages of TTF-HLCT to enhance the $\eta_{exciton}$ for high EL efficiencies and the merits of AIE to ensure low roll-off of device efficiency. The anthracene groups are twisted from the central TPE moiety, which effectively prevents bathochromic shift of emission as shown in its crystallographic structure. In addition, a D-A structure was built by using methoxy and cyano to improve the charge balance in the devices. In addition, the material possesses high thermal stability with a T_g of 155 °C. The non-doped device achieved the high performance with a V_{on} of 2.6 V at a luminance of 1 cd m^{-2}, a $\eta_{PE, max}$ of 11.1 lm W^{-1}, a $\eta_{CE, max}$ of 9.9 cd A^{-1}, and a low η_{CE} roll-off. The doped device based on TPEA was fabricated to acquire deep blue emission with CIE coordinates of (0.15, 0.09), showing a $\eta_{ext, max}$ up to 8.0% and the highest $\eta_{PE, max}$ of 7.3 lm W^{-1} among all the TTF and HLCT deep-blue emitters. Inspired by these preliminary results, we believe that the combination of the merits of TTF-HLCT and AIE would be a promising molecular design principle for exploring highly efficient deep blue emitters [4].

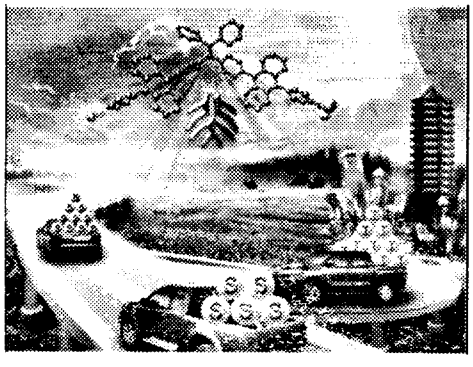

Figure 1: A combinational molecular design to achieve highly efficient deep blue electrofluorescence

References

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