

Novel High Performance Hole Transporting Materials for OLEDs

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Transport (hole and electron) materials are an essential component in the development of OLEDs as they play a critical role in providing balanced charge injection and transport [1, 2]. We have synthesized two new hole transporting materials (HTS-08 and HTS-11) with high triplet energies (2.8 and 2.9 e.V.) and high Tg values (135 and 124 °C). HTS-08 is solution processible and thus an exciting material for low-cost device manufacture. We prepared three devices: the first with α -NPB (a well-established OLED HTL material) for comparison, the second with HTS-11 (both via vacuum thermal evaporation) and the third with HTS-08 via spin coating. The energy level diagram and device structure is given in Fig. 1. As can be seen in Fig. 2, HTS-11 gives over 63% increase in current efficiency and 53% power efficiency (58.8 cd/A and 29.1 lm/W @ 10000 nits for HTS-11) compared with α -NPB as a hole transporter (35.9 cd/A and 18.9 lm/W @ 10000 nits for α -NPB) and the solution-processed HTS-08 devices demonstrated similar performance (36.5 cd/A and 16 lm/W @ 10000 nits) to the α -NPB device. Furthermore, preliminary measurements indicate that device lifetimes of HTS-11 is also comparable to α -NPB.

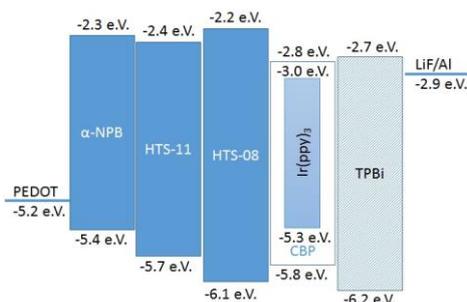


Fig. 1. Energy level diagram of OLED with α -NPB, HTS-11 or HTS-08 as the hole transporting layer

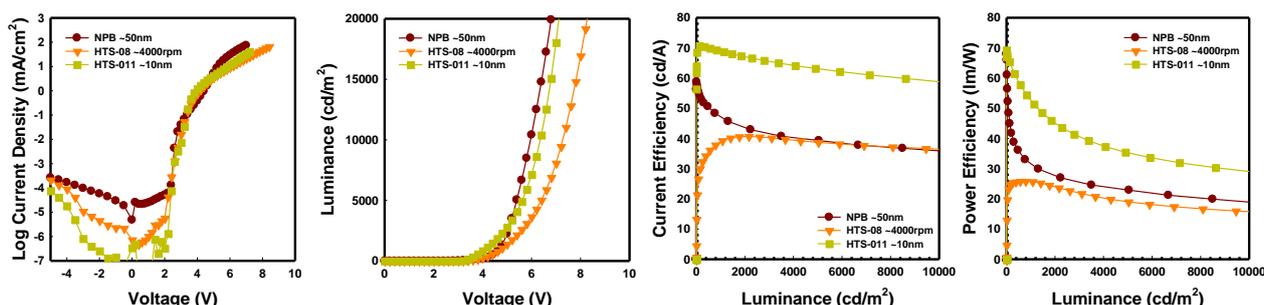


Fig. 2. Device performance comparison of α -NPB, HTS-08 and HTS-11. Current density vs voltage; Luminance vs voltage; Current efficiency vs luminance and Power efficiency vs luminance

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References

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