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A New Alternative Hole-transporting Layer to PEDOT:PSS for Realizing Highly Efficient All Solution-processable PLEDs

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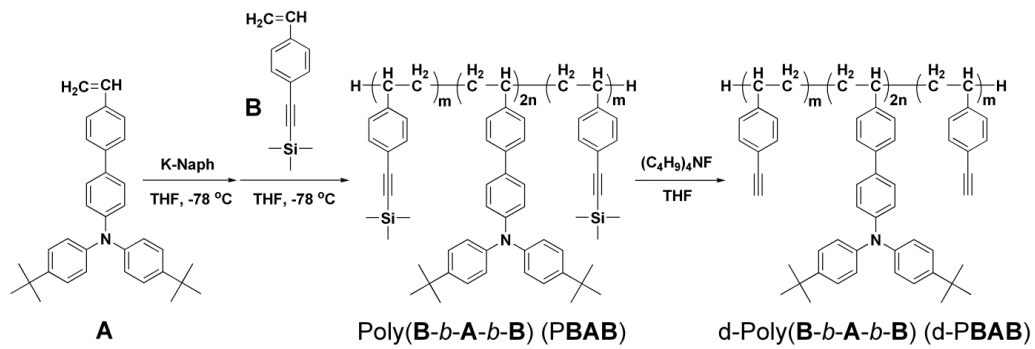
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A new cross-linkable polymer¹⁻³, cross-linked d-PBAB, which has the triphenylamine²⁻³ as the hole transporting moiety and ethynyl group⁴⁻⁵ as the thermal cross-linker is firstly synthesized by the combination of anionic polymerization and deprotection process. The thermal cross-linking reaction was performed at 240°C for 50 min and cross-linked d-PBAB layer showed smooth surface and is not soluble at organic solvent under spin-coating of emitting layer (EML). The solution-processed PLED which was fabricated with cross-linked d-PBAB as HTL showed approximately two times higher Lmax and four times higher LEmax than those obtained from PLED with PEDOT:PSS as the HTL. These result is ascribed to better ability of cross-linked d-PBAB to block electrons and to prevent exciton-quenching than those of PEDOT : PSS at the EML interface. This results strongly suggested that cross-linked d-PBAB can be a promising material to replace conventional PEDOT : PSS. It can be suspected that PLEDwith cross-linked d-PBAB would show longer lifetime compared with that of PLED with PEDOT : PSS, and thus further studies are under investigation.

References

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Scheme 1. Synthesis of thermally cross-linkable polymer, d-PBAB, by anionic polymerization and deprotection reaction.

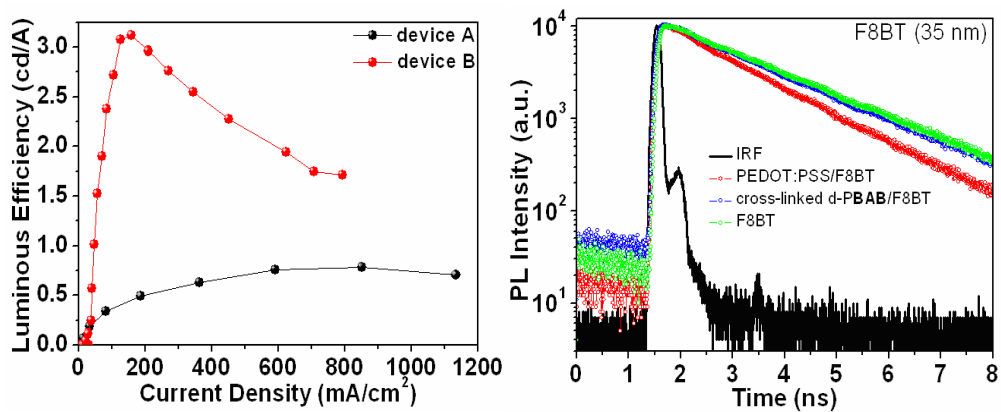


Fig. 1. (Left) Luminous efficiency vs. current density characteristics of device (ITO/PEDOT:PSS/F8BT/Ca/Al) and B (ITO/cross-linked d-PBAB/F8BT/Ca/Al), (Right) PL decay profiles of quartz/F8BT, quartz/PEDOT : PSS/F8BT and quartz/cross-linked d-PBAB/F8BT.