NEW CARBAZOLE BASED HOST MATERIALS FOR THERMALLY ACTIVATED DELAYED FLUORESCENT OLEDS

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Host materials are one of the key factors which improve the performance of OLEDs. An ideal host material should possess some characteristics. Firstly, the singlet and triplet energy of host should be higher than that of dopants, which prevents the reverse energy transfer from dopant to host and confines excitons in the emissive layer. Secondly, HOMO-LUMO energies of host materials should be as similar with adjacent layers as possible to reduce the driving voltage of the device. In addition, host material needs to possess a balanced hole-electron mobility. Lastly, good thermal and morphological stability is desired [1-3]. We introduce two novel TADF host materials containing two substituted carbazole moieties with central diphenyl sulfone electron accepting group as shown in Fig. 1.

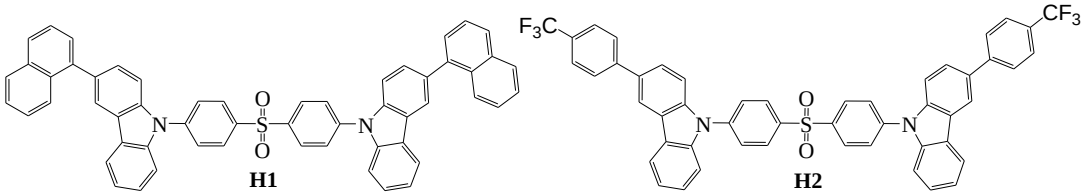

Fig. 1. Chemical structures of novel host materials H1 and H2.

The behaviour of the synthesized materials under heating was studied by DSC under a nitrogen atmosphere. When samples of the materials were heated, glass transitions were observed at 177 °C for **H1** and 213 °C for **H2** and no peaks due to crystallization and melting appeared during the further heating. We utilized the solution-processable host materials to fabricate the 2,4,5,6-tetra(9H-carbazol-9-yl)isophthalonitrile (4CzIPN) emitter based green TADF OLEDs. Among them, device which used host **H2** showed the best performance. It exhibited a maximum power efficiency of 20.8 lm/W, current efficiency of 33.1 cd/A, and external quantum efficiency of 13.7%. The excellent performance may be attributed to the low singlet-triplet energy gap (ΔE_{ST}), high photoluminescence quantum yield (PLQY) of emitting layer, high thermal stability, and unique porous morphology of the host material **H2**.

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References

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