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Benzothiadiazole Based "Hot Exciton'' Materials for Red Electroluminescence with Maximum External Quantum Efficiency Approaching 10%

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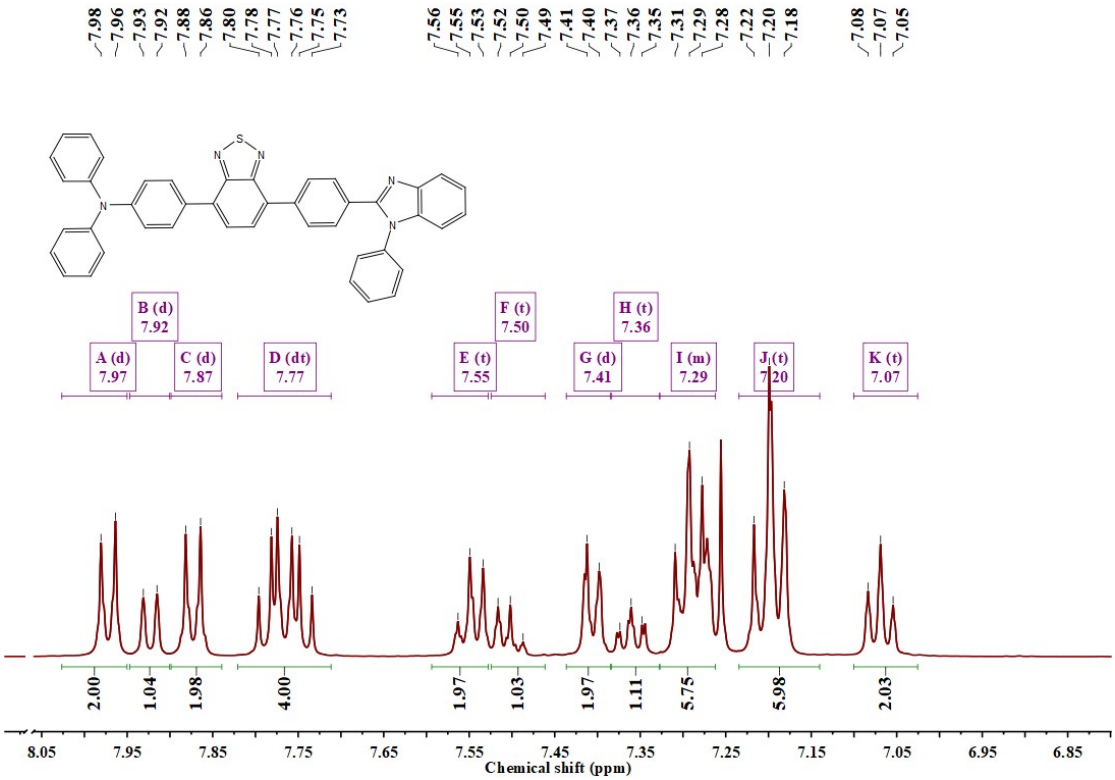

Fig. S1. ^{1}H-NMR spectra of **TPA-BT-PBI** in CD_2Cl_2.

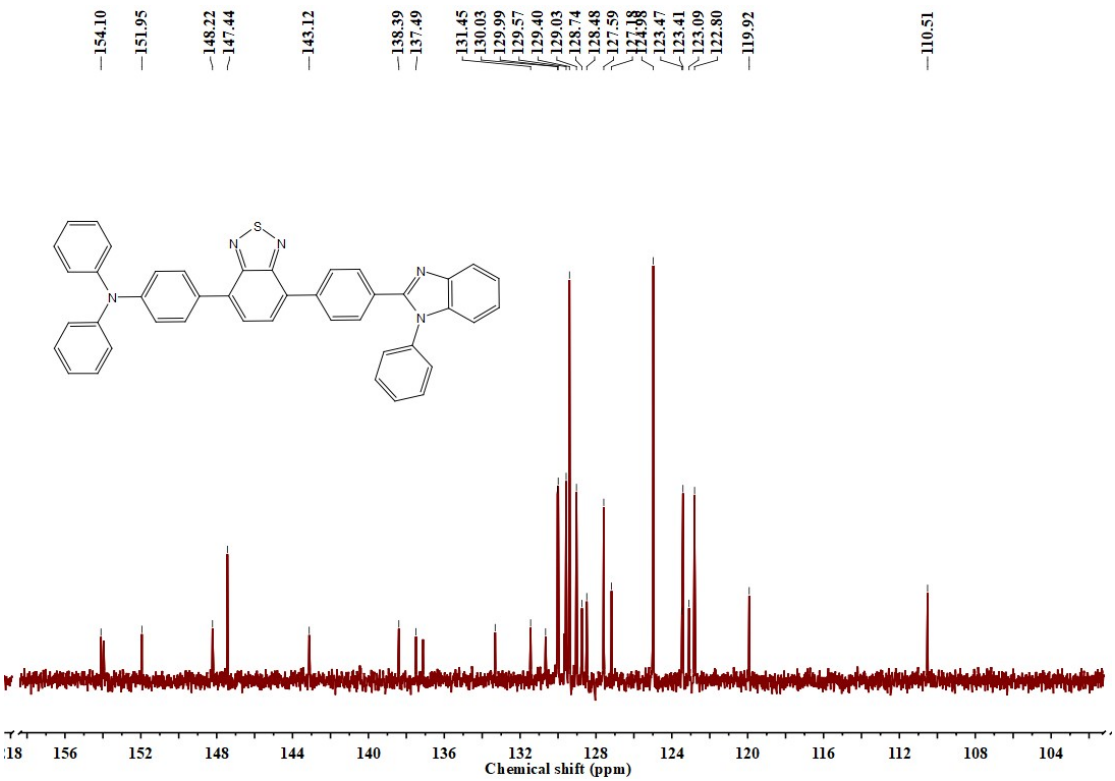

Fig. S2. ^{13}C-NMR spectra of **TPA-BT-PBI** in CD_2Cl_2.

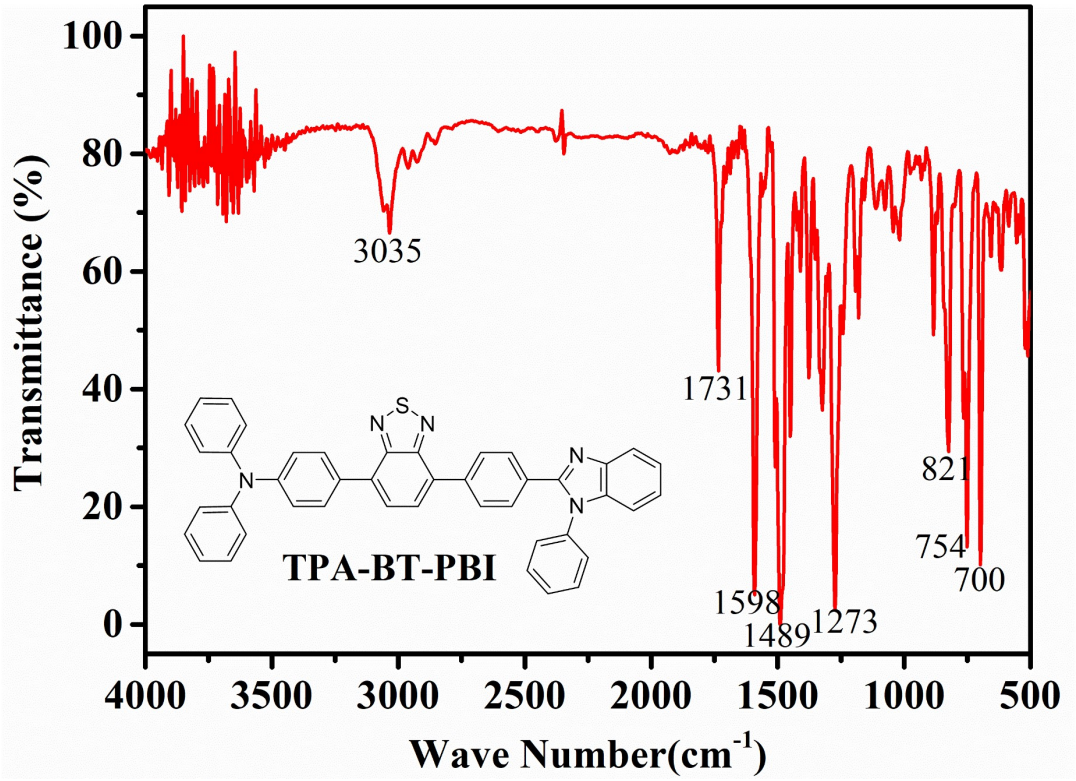

Fig. S3. FT-IR spectra of **TPA-BT-PBI** in the KBr matrix.

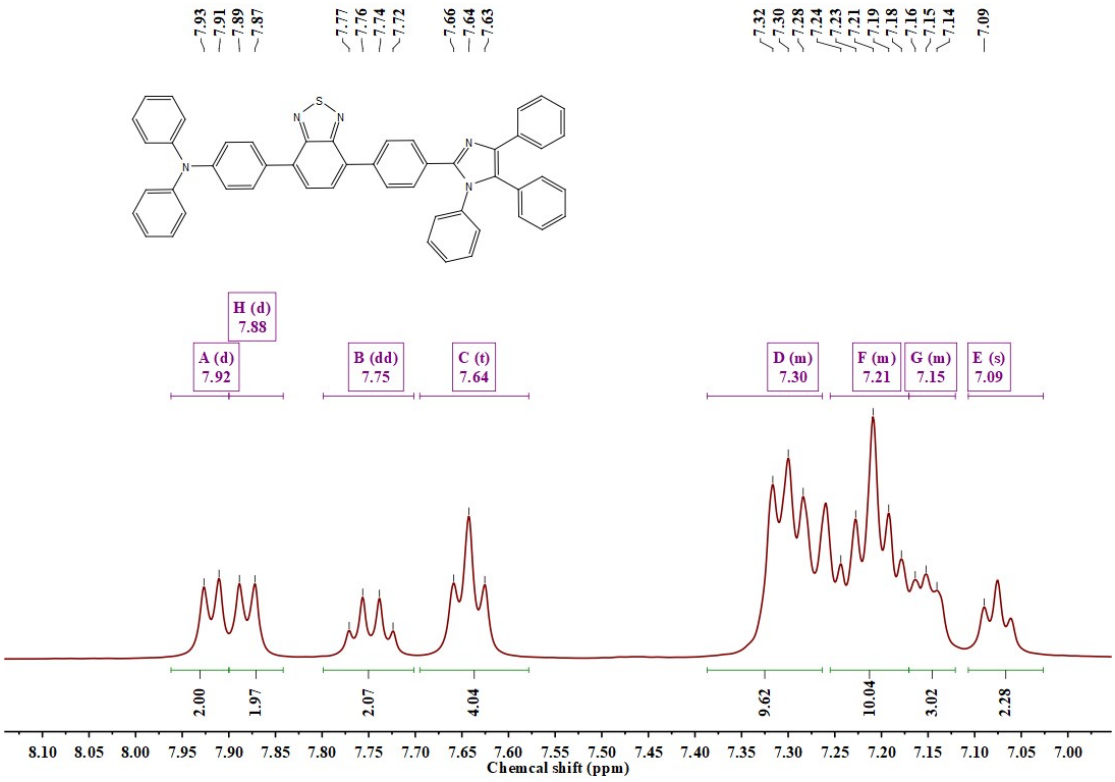

Fig. S4. ^{1}H-NMR spectra of **TPA-BT-IM** in CD_2Cl_2.

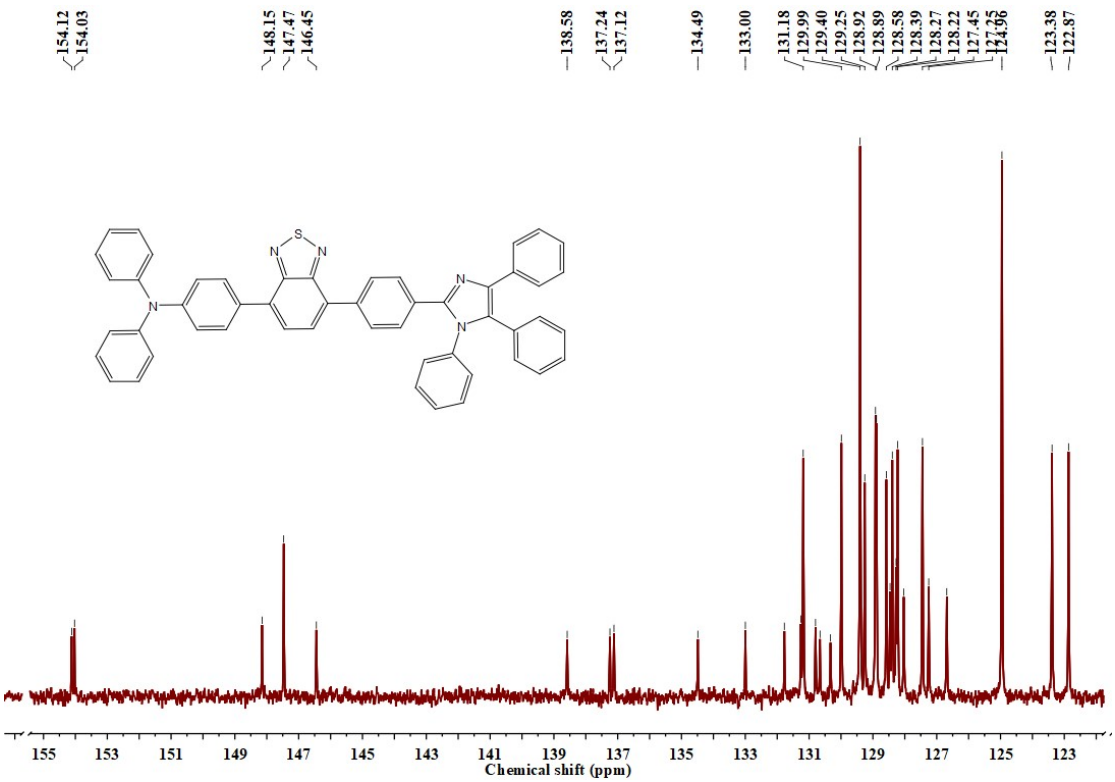

Fig. S5. ^{13}C-NMR spectra of **TPA-BT-IM** in CD_2Cl_2.

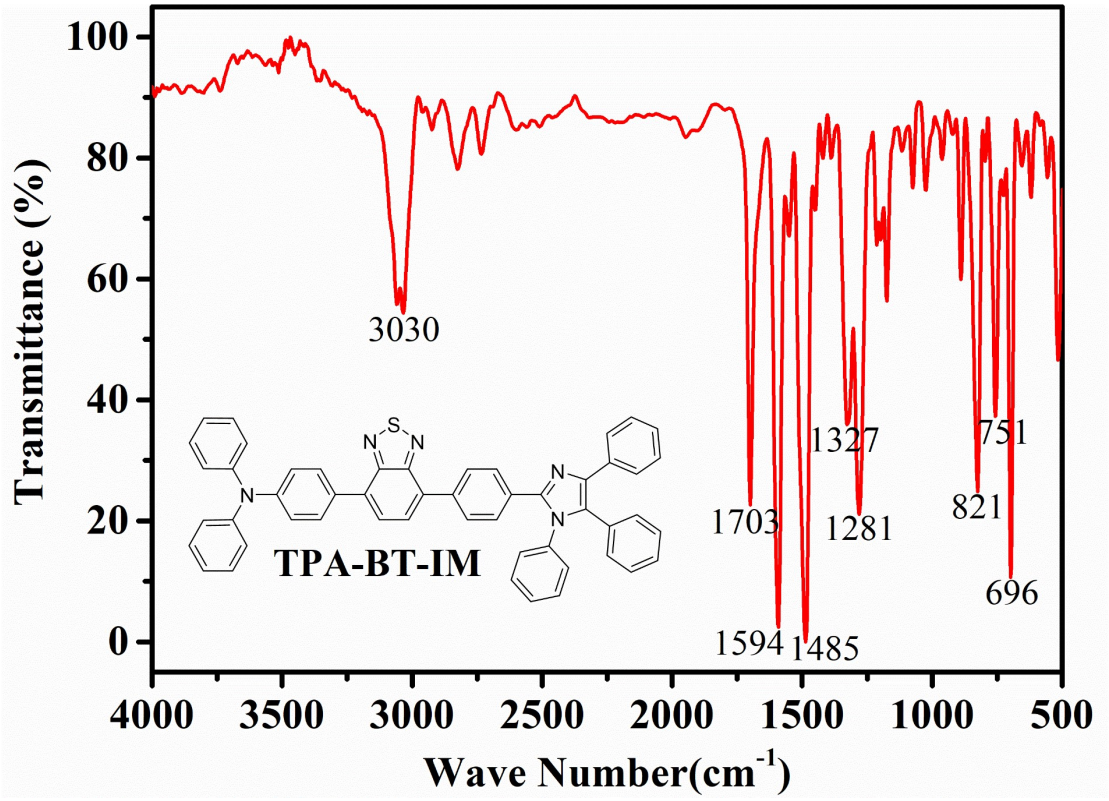

Fig. S6. FT-IR spectra of **TPA-BT-IM** in the KBr matrix.

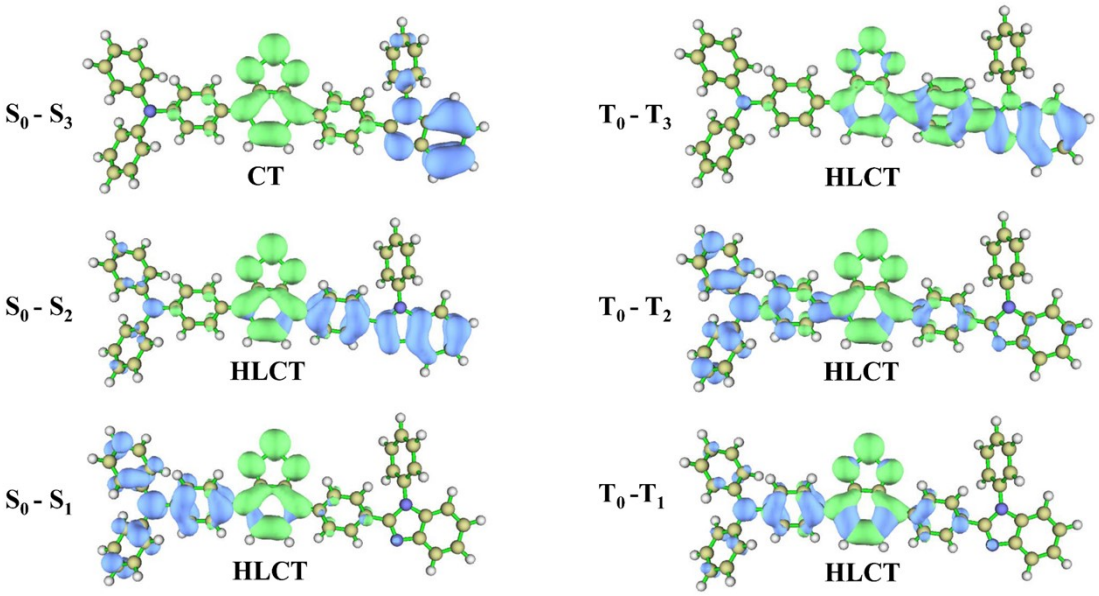

Fig. S7. Natural transition orbitals of $S_0 \rightarrow S_n$ and $T_0 \rightarrow T_n$ (n = 1-3) of **TPA-BT-BPI**. The blue and green isosurfaces present hole and electron distribution, respectively.

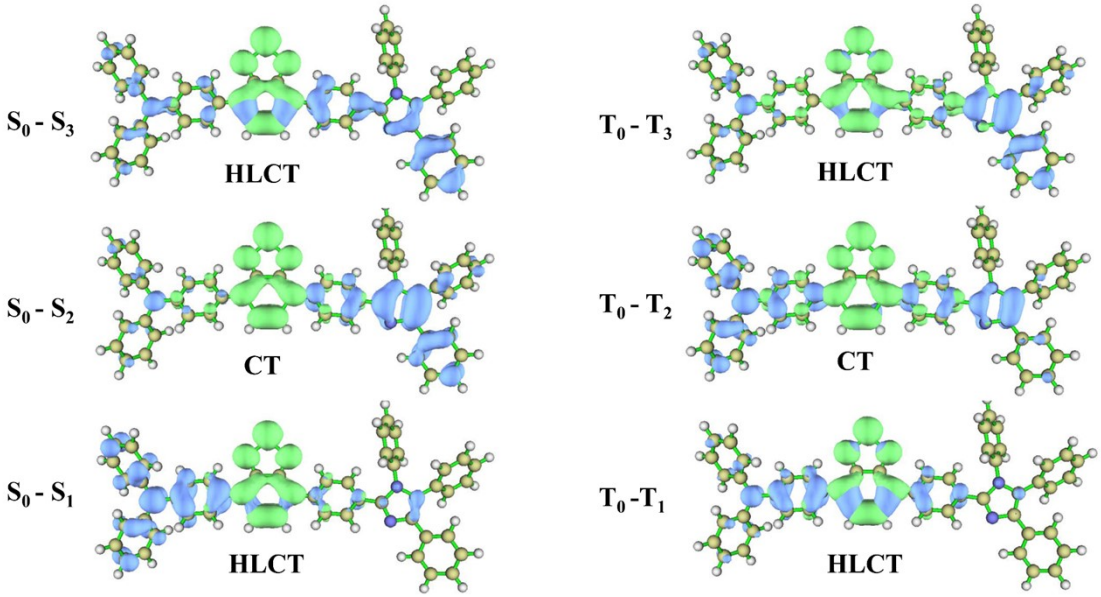

Fig. S8. Natural transition orbitals of $S_0 \rightarrow S_n$ and $T_0 \rightarrow T_n$ (n = 1-3) of **TPA-BT-IM**. The blue and green isosurfaces present hole and electron distribution, respectively.

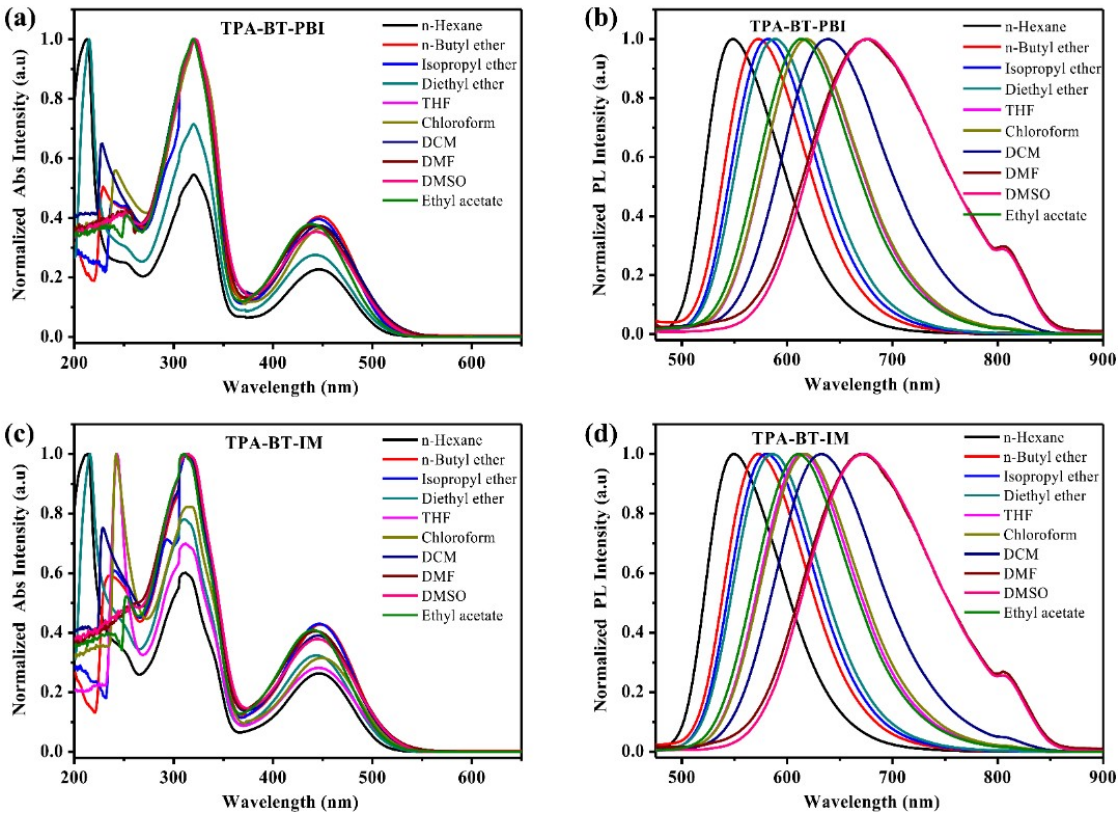

Fig. S9. Normalized UV-vis absorption and photoluminescence spectra of **TPA-BT-PBI** and **TPA-BT-IM** in different solvents.

Table S1. The absolute PLQY of **TPA-BT-PBI** and **TPA-BT-IM** in neat films or doped in various hosts (10 wt%).

Compounds	**PLQY** (%)[a]				
	Neat[b]	**CBP**[c]	**CDBP**[d]	**mCP**[e]	**TPBi**[f]
TPA-BT-PBI	55/56	80/87	51/56	71/83	77/85
TPA-BT-IM	51/54	74/86	77/88	76/87	75/95

[a]PLQY of compounds tested with and without oxygen, respectively; [b]Neat means neat film; [c]CBP stands for 4,4'-Bis(N-carbazolyl)-1,1'-biphenyl; [d]CDBP stands for 4,4'-bis(9-carbazolyl)-2,2'-dimethyl-biphenyl; [e]mCP stands for 1,3-Di-(9-carbazolyl)benzene; [f]TPBi stands for 1,3,5-Tris(N-phenylbenzimidazol-2-yl)benzene.

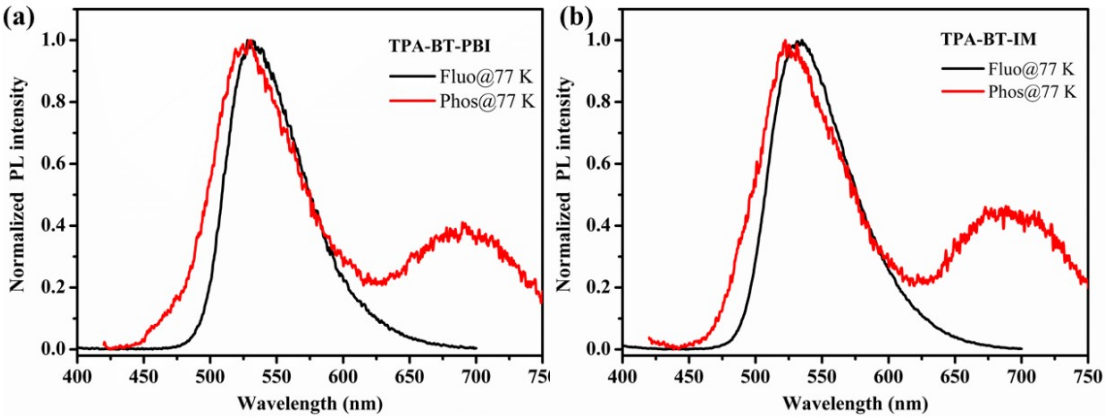

Fig. S10. Fluorescence and phosphorescence spectra of **TPA-BT-PBI** (a) and **TPA-BT-IM** (b) in toluene at 77 K.

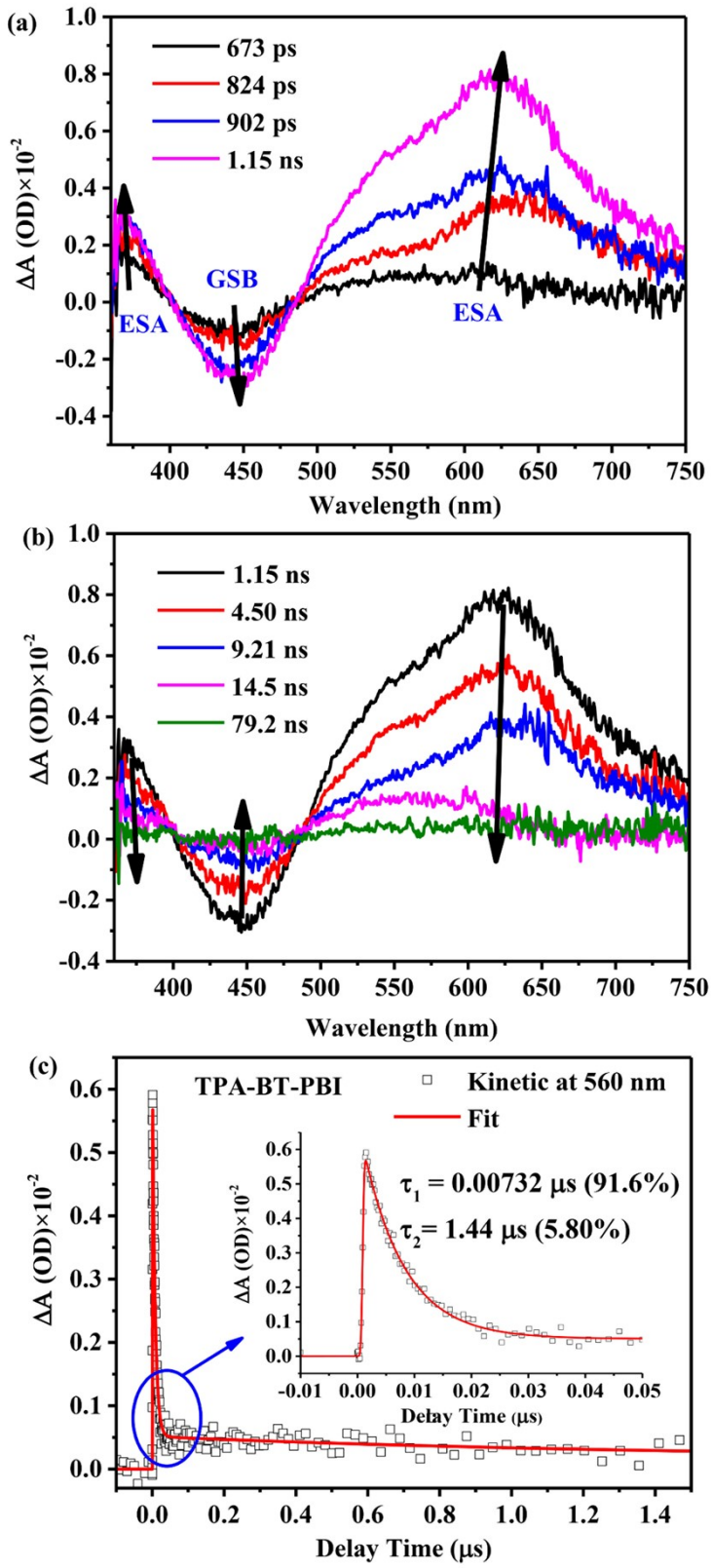

Fig. S11. TA spectra of **TPA-BT-PBI** in DCM solution were obtained after 320 nm excitation from 673 ps to 1.15 ns (a), 1.15 ns to 79.2 ns (b), and fitted kinetics at 560 nm of TA (the inset shows the enlarged time scale) (c).