Highly efficient and stable green fluorescent OLEDs with high color purity using a BODIPY derivative

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General Information

UV-Vis spectra was measured using a Shimadzu UV-3150 UV-vis-NIR spectrophotometer. Photoluminescence spectra were measured using a FluroMax-2 (Jobin-Yvon-Spex) luminescence spectrometer. The ionization potential (I_p) was determined using a Sumitomo Heavy Industries, Ltd PYS-201 in vacuum (~10^{-3} Pa).[1] Photoluminescence quantum yield were measured using a Hamamatsu C11347 absolute PL quantum yield spectrometer with an integral sphere at an excitation wavelength of each sample.

Device Fabrication

The substrates were cleaned with ultra-purified water and organic solvents (acetone and then isopropanol), and then dry-cleaned for 30 min by exposure to UV-ozone. The organic layers were deposited onto the ITO substrate in vacuum (ca. 10^{-5} Pa) successively. Al was patterned using a shadow mask with an array of 2 mm × 2 mm openings without breaking the vacuum (ca. 10^{-5} Pa). The EL spectra were taken using an optical multichannel analyzer Hamamatsu Photonics PMA-11. The current density–voltage and luminance–voltage characteristics were measured using a Keithley source measure unit 2400 and a Minolta CS200 luminance meter, respectively.

[1] H. Ishii, D. Tsunami, T. Suenaga, N. Sato, Y. Kimura, M. Niwano, J. Surf. Sci. Soc. Jpn. 2007, 28, 264.

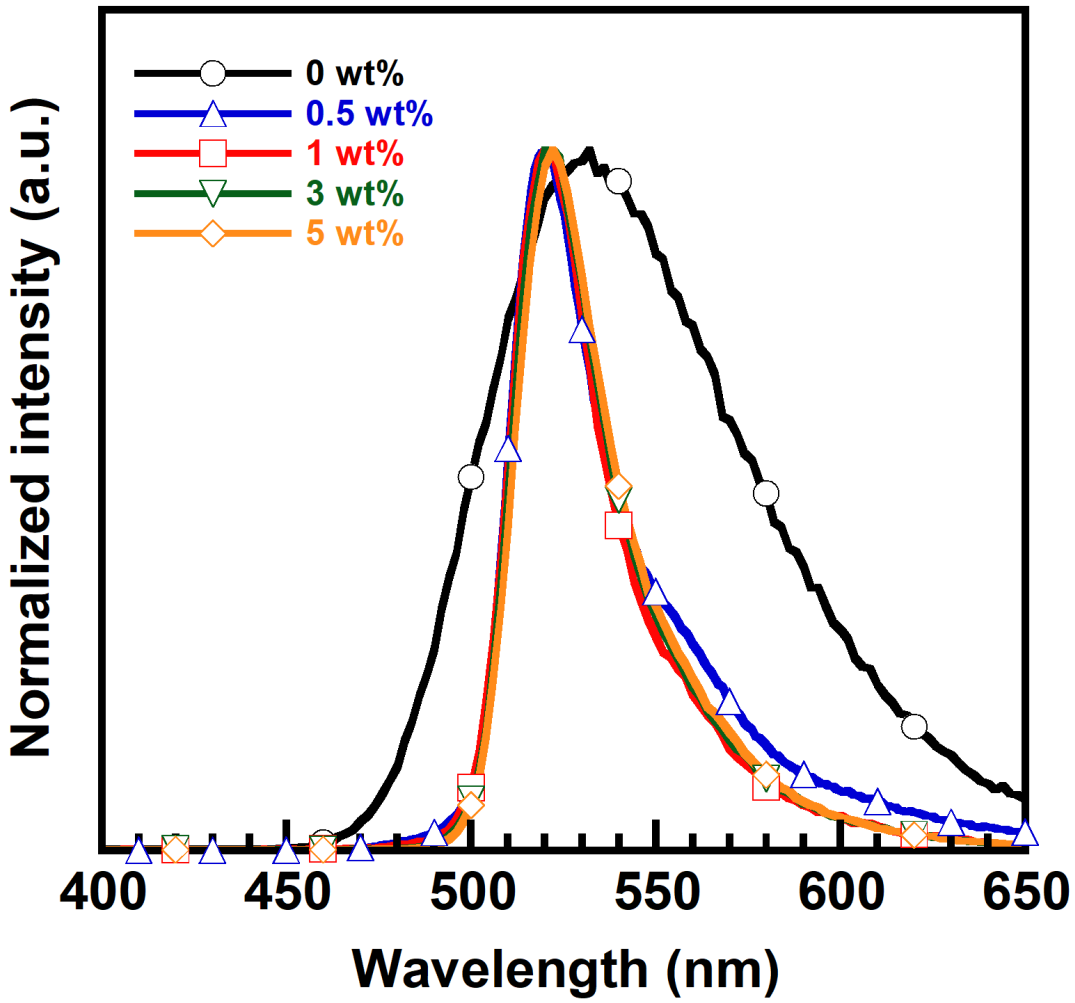

Figure S1. Normalized PL spectra of the **(80 - x) wt% mCBP: 20 wt% 4CzIPN: x wt% tPhBODIPY** co-deposited film.

Table S1. Summary of photophysical properties for tPhBODIPY/4CzIPN/mCBP co-deposited film.

wt%	λ_{PL} (nm)[a]	FWHM (nm)[b]	PLQY (%)[c]
0	532	80	74.4
0.5	521	30	79.0
1.0	522	29	79.2
3.0	522	30	72.7
5.0	522	30	64.7

[a]Phtoluminescence peaks of the **(80 - x) wt% mCBP: 20 wt% 4CzIPN: x wt% tPhBODIPY** co-deposited film. [b]Full width at half maximum.[c]Photoluminescence quantum yield of the **(80 - x) wt% mCBP: 20 wt% 4CzIPN: x wt% tPhBODIPY** co-deposited film.

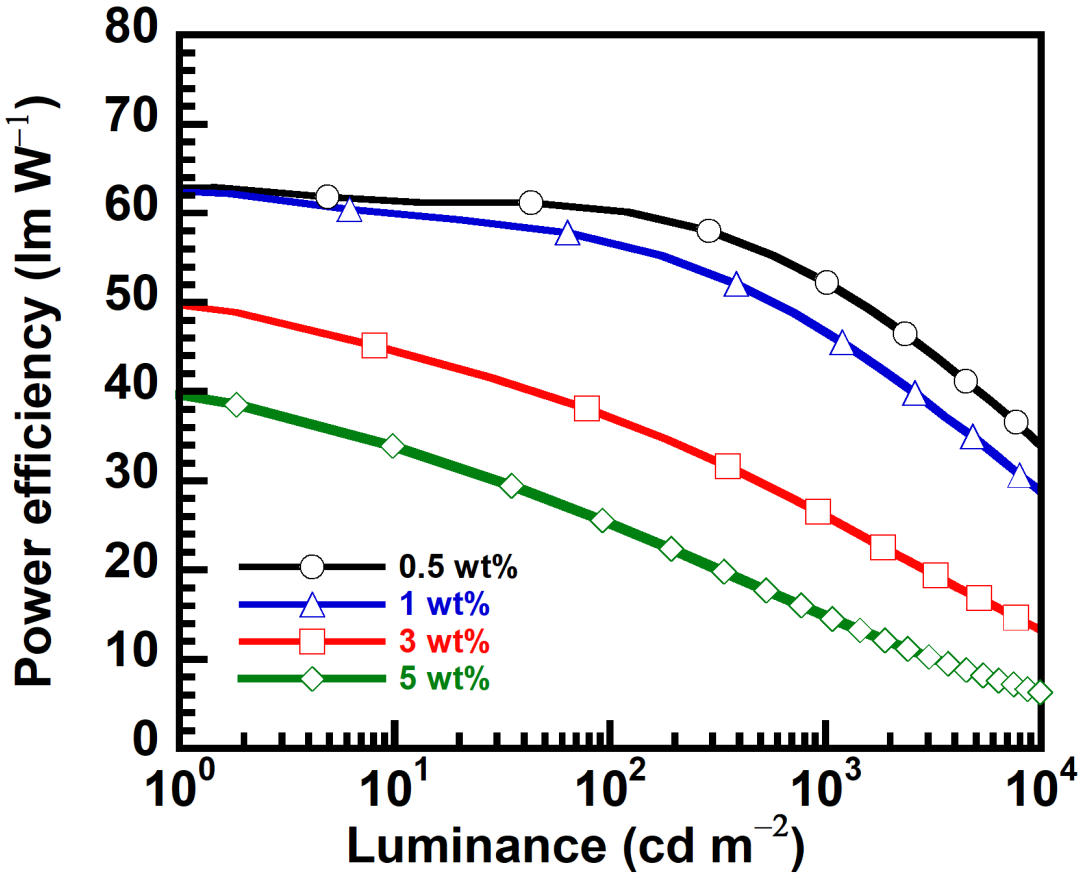

Figure S2. Power efficiency-luminance (*PE-L)* characteristics for OLEDs with different tPhBODIPY concentrations from 0.5 to 5 wt%.

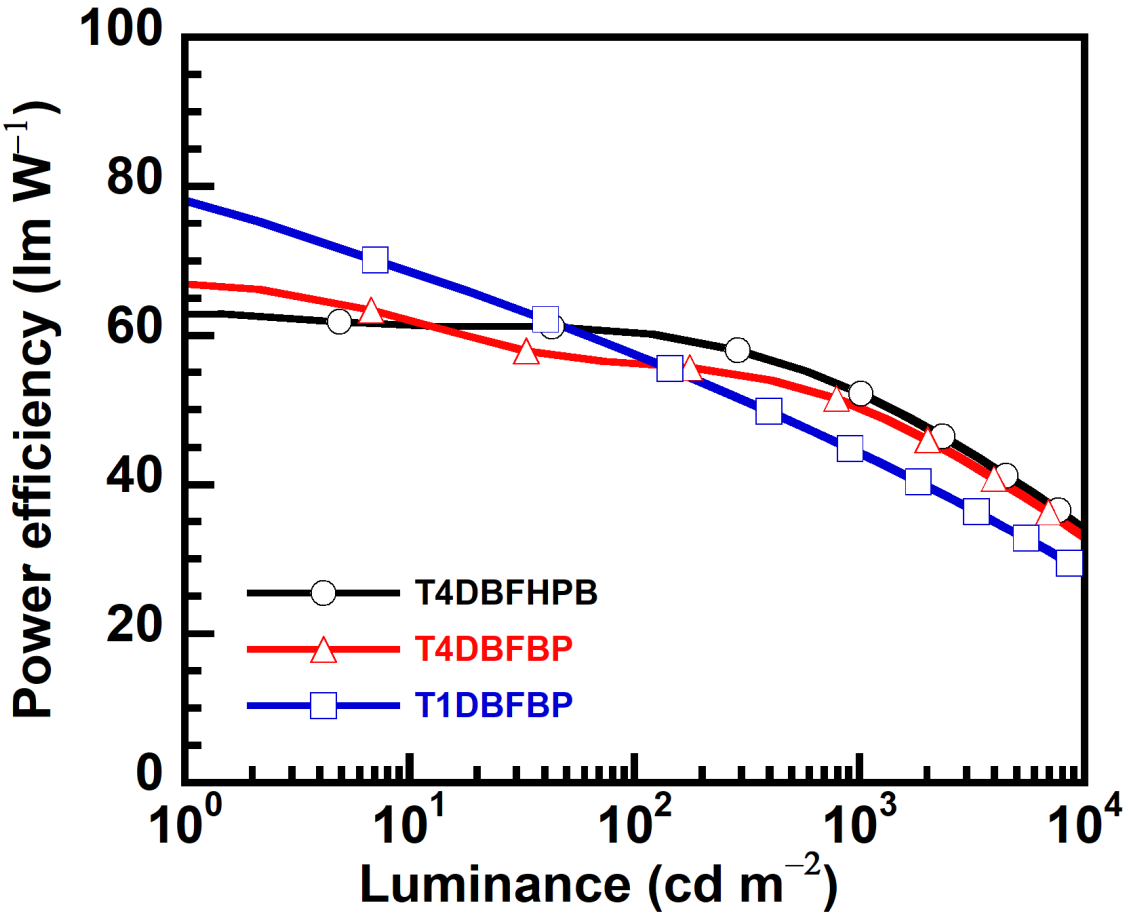

Figure S3. *PE-L* characteristics for OLEDs with different HTLs.

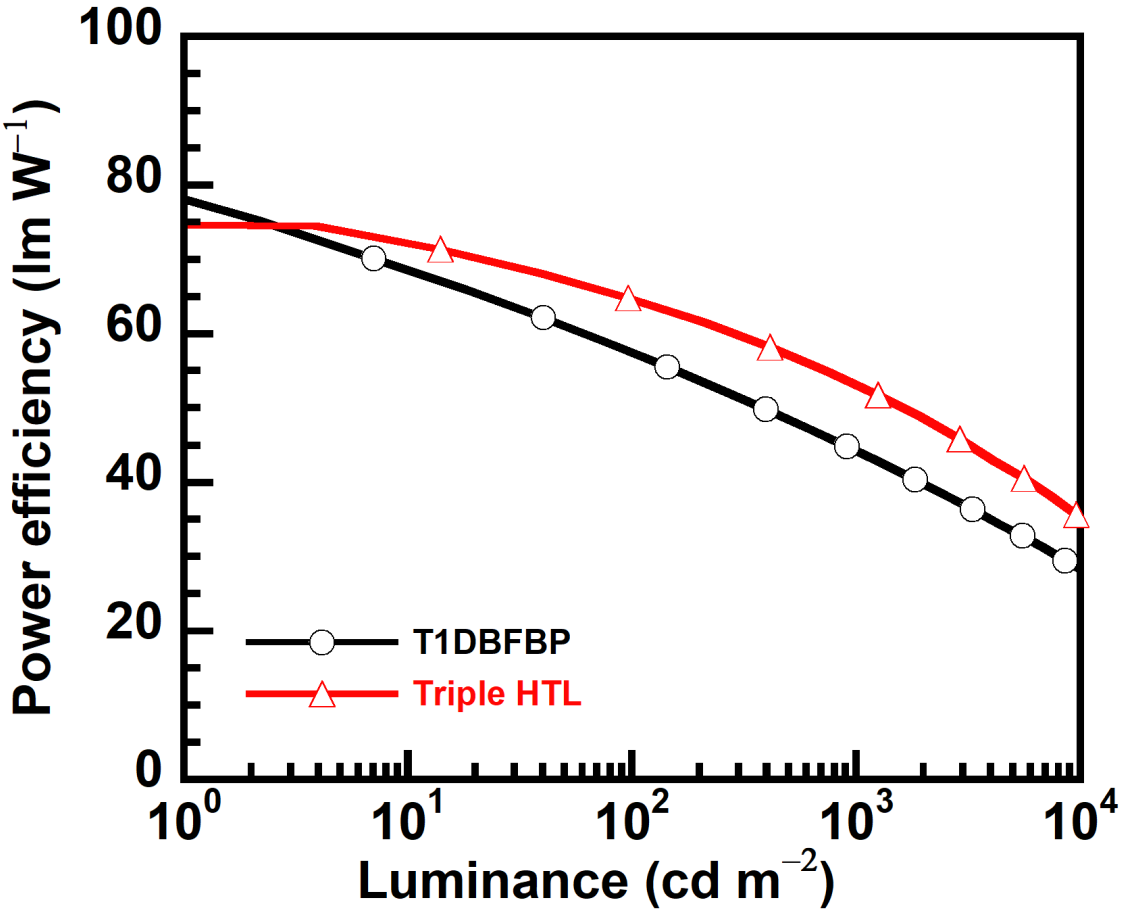

Figure S4 *PE-L* characteristics for OLEDs with T1DBFBP and triple HTLs.

Table S2. Summary of lifetime at different brightness estimated using the well-known formula of $T_{50}(L) = (L_0/L)^n \times T_{50}(L_0)$ (n = 1.75) [1].

HTL	LT_{50} (h) at 100 cd m^{-2}	LT_{50} (h) at 500 cd m^{-2}	LT_{50} (h) at 1000 cd m^{-2}	LT_{50} (h) at 3000 cd m^{-2}
T4DBFHPB	465834	27863	8283	1211
T4DBFBP	645966	38638	11487	1680
T1DBFBP	803303	48049	14285	2089
Triple HTL	811730	48553	14435	2111

Ref. [1] D. Zhang, M. Cai, Y. Zhang, D. Zhang, L. Duan, *Mater. Horiz.* **2016**, 3, 145-151.