Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Solution-Processable Host Material of 1,3-Bis{3-[3-(9-carbazolyl)phenyl]-9-carbazolyl}benzene and Its Application for Organic Light Emitting Diodes Employing Thermally Activated Delayed Fluorescence

Yoshitake Suzuki [a, b], *Qisheng Zhang* [a], *Chihaya Adachi* [a,*]

[a] Center for Organic photonics and Electronics Research (OPERA), Kyushu University, 744 Motooka, Nishi, Fukuoka 819- 0395, Japan

[b] Sumitomo Riko Company, Ltd., Material Technology R&D Laboratories, 1 Higashi 3-chome, Komaki, Aichi 485-8550, Japan

[*] Electronic mail: adachi@cstf.kyushu-u.ac.jp

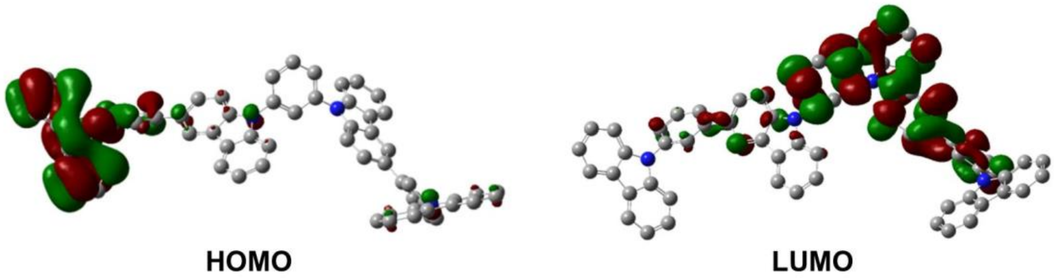

Fig. S1 The HOMO and LUMO of **CPCB** calculated at the B3LYP/6-31G* level. The calculated S_1 and T_1 energies of SPH-01 are 3.23 and 3.06 eV, respectively.

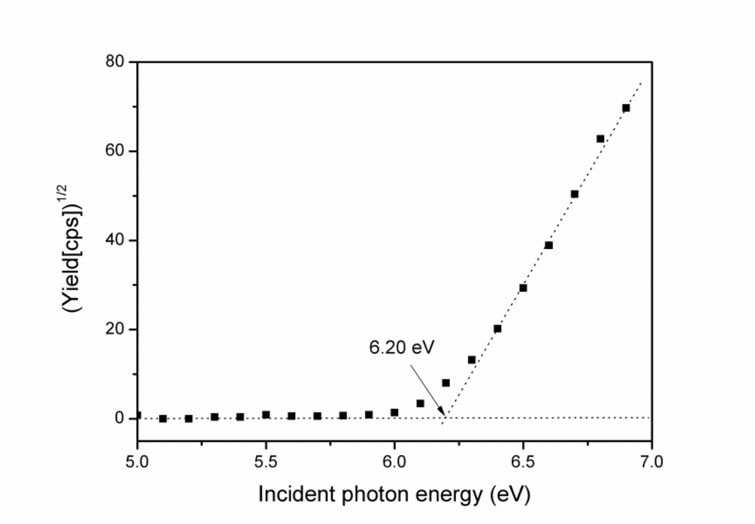

Fig. S2 The photoelectron yield spectra of the neat films of **CPCB**.

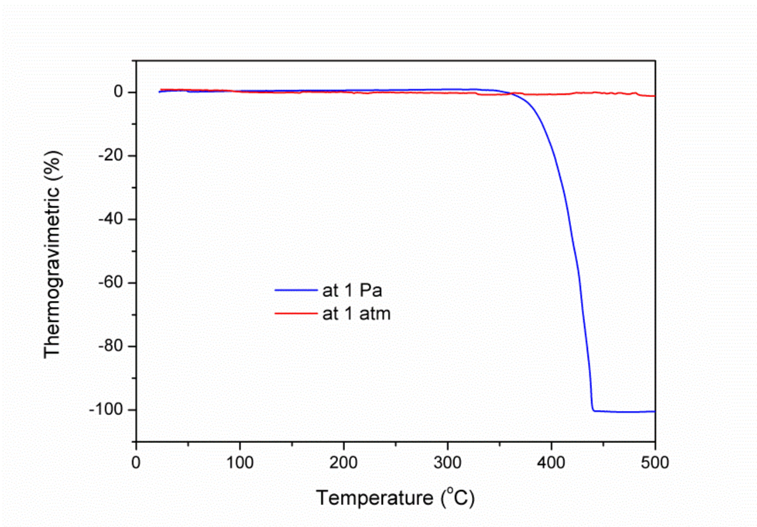

Fig. S3 Thermogravimetric analysis of **CPCB** at 1 Pa and 1 atm under N_2.

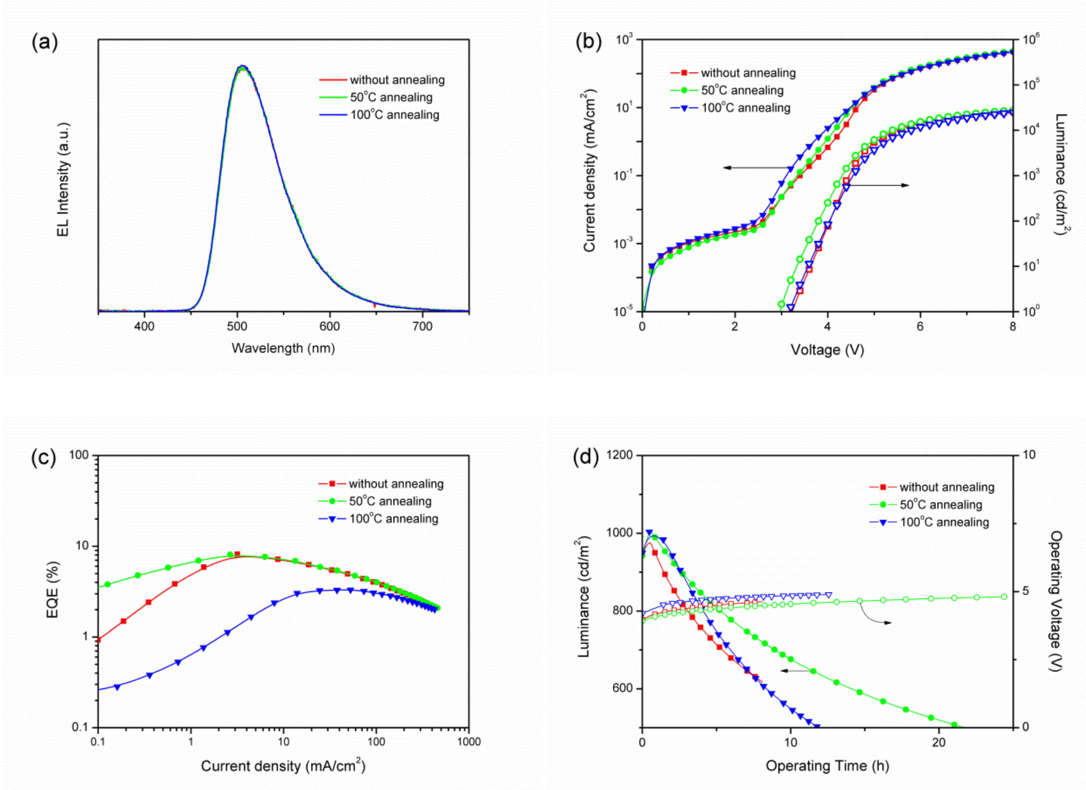

Fig. S4 **(a)** EL spectra at 10 mA/cm^2; **(b)** luminance-current density-voltage characteristics; **(c)** EQE-current density characteristics; and **(d)** luminance-voltage-operating time characteristics at fixed current densities of ITO/PEDOT (40 nm)/ CBP: 4CzIPN (30 nm)/T2T (10 nm)/BPyTP2(30 nm)/LiF(0.8 nm)/Al devices with an emitting layer annealed at different temperatures. The device with an emitting layer annealed at 50 ℃ performed best. Since the annealing temperature of 100 ℃ is higher than the glass transition temperature of CBP (62 ℃), the corresponding device had a low EQE maximum due to the formation of CBP dimers, which have low triplet energy levels.

Fig. S5 Photographs of ~100 nm thin films deposited on quartz substrates after one week. **(a)** Vacuum-deposited CBP film; **(b)** spin-coated CBP film annealed at 50 ℃ for 10 min; **(c)** spin-coated CPCB film annealed at 220 ℃ for 10 min. The spin-coated CBP film partly crystallized, while the vacuum-deposited CBP and spin-coated CPCB films were still amorphous.

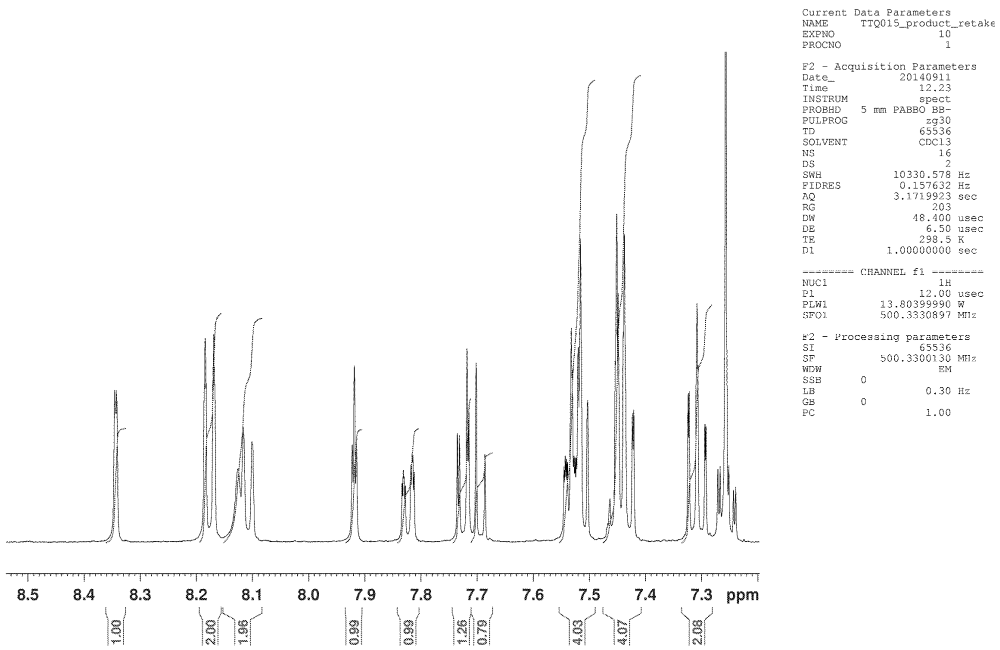

Fig. S4 ^{1}H NMR spectra of compound **iii**.

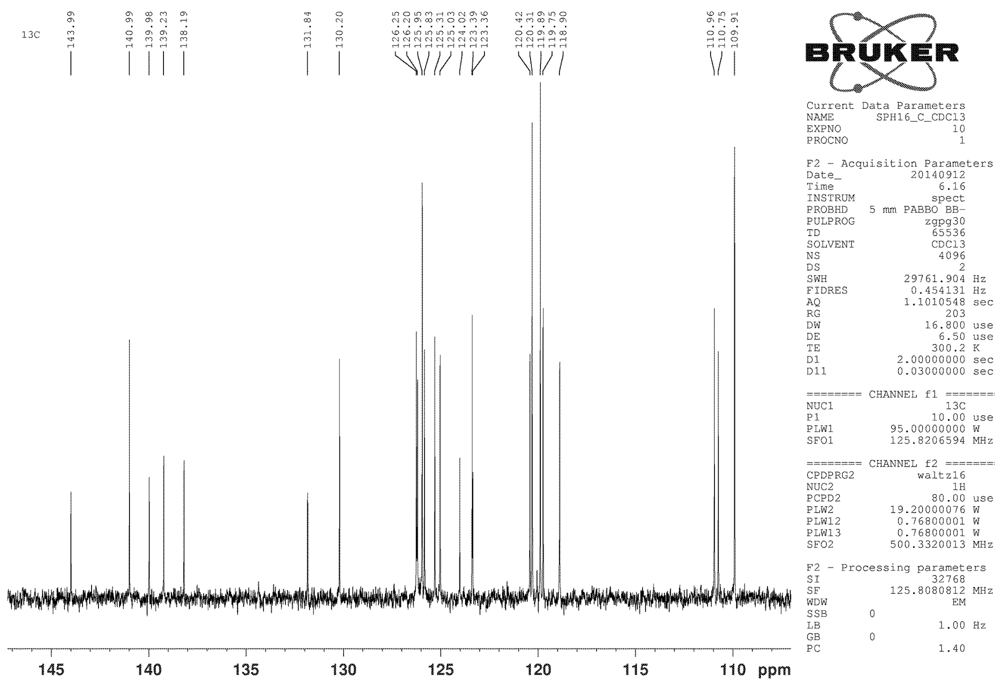

Fig. S5 ^{13}C NMR spectra of compound **iii**.

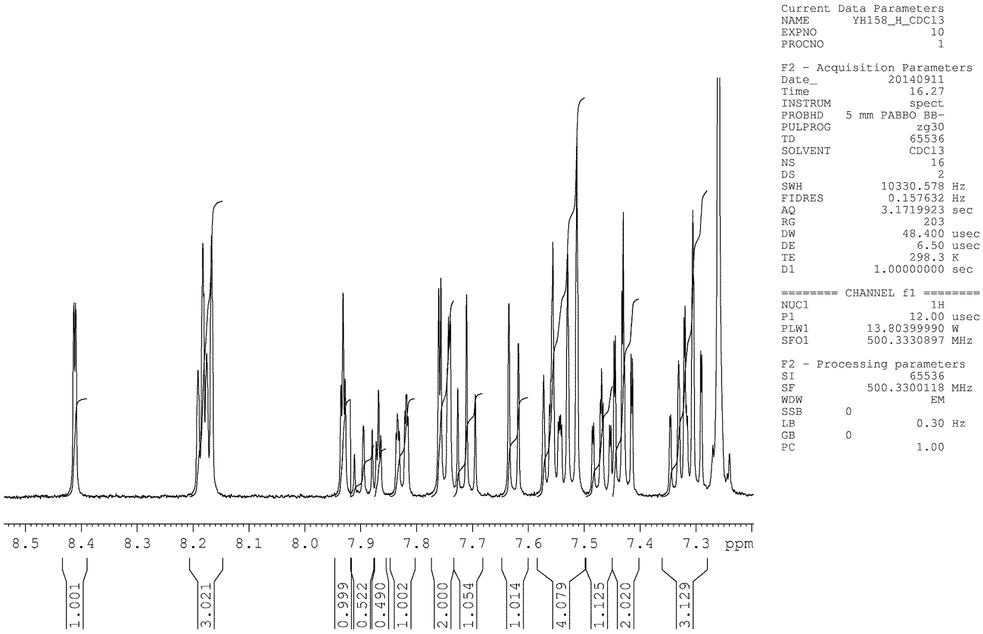

Fig. S6 ^{1}H NMR spectra of compound **CPCB**.

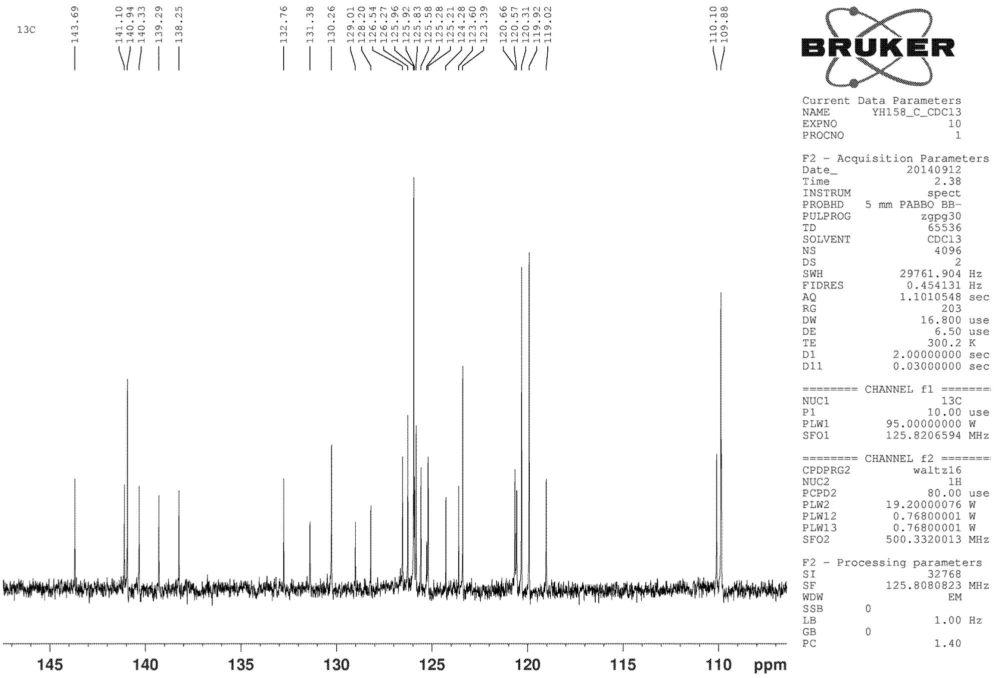

Fig. S7 ^{13}C NMR spectra of compound **CPCB**.