



Reference Study_BODIPY Dyes_tPhBODIPY

Strategically Modulating Carriers and Excitons for Efficient and Stable Ultrapure-Green Fluorescent OLEDs with a Sterically Hindered BODIPY Dopant

Xiaozeng Song⁽¹⁾, Dongdong Zhang⁽¹⁾, Yuwei Zhang⁽¹⁾, Yang Lu⁽¹⁾, and Lian Duan^(1,2)

⁽¹⁾ Key Lab of Organic Optoelectronics and Molecular Engineering of Ministry of Education, Department of Chemistry, Tsinghua University, Beijing, China

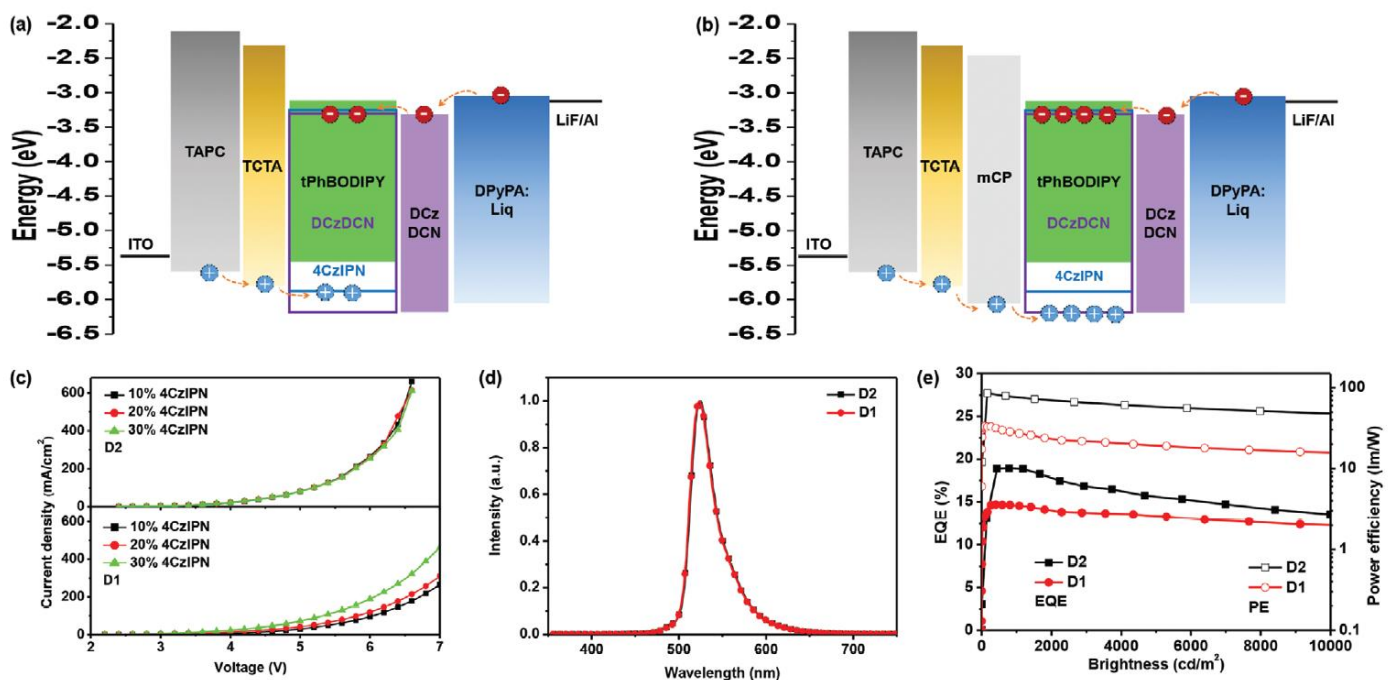
⁽²⁾ Center for Flexible Electronics Technology, Tsinghua University, Beijing, China

Reference: *Adv. Optical Mater.* 2020, 2000483. <https://doi.org/10.1002/adom.202000483>

Abstract

- Ultrapure colors are vital for displays to obtain the highly desired wide color gamut. Till now, only boron-dipyrromethene derivatives (BODIPYs) have demonstrated ultrapure full-colors but suffer from low excitons utilization efficiency as dopants in organic light-emitting diodes.
- A sterically hindered BODIPY-type dopant **tPhBODIPY** with a bulk substituent on the meso-position is developed to suppress DET, exhibiting a high photo-luminescence quantum yield of 98% and a small full width at half maximum of 28 nm.
- A state-of-the-art EQE/power efficiency of 19.0%/85.7 lm W⁻¹ are realized together with an ultrapure-green emission of CIE coordinates of (0.26, 0.67) and a long half-lifetime of 2947 h at an initial luminance of 1000 cd m⁻².

Materials & Devices



Materials are used by qualified for testing and research only, there are not guaranteed in patent contention by customer use.

Head office : 31F-5, No. 99, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22175, Taiwan, R.O.C., TEL : ++886-2-2697-5600, FAX : ++886-2-2697-5601.

Factory : 2F, No. 17, R&D Road II, Science-Based Industrial Park, Hsin-Chu 30076, Taiwan, R.O.C., TEL: +886-3-666-3188, FAX: +886-3-666-9288.

總公司 : 22175 新北市汐止區新台五路一段 99 號 31 樓之 5 Tel: 02-2697-5600 Fax: 02-2697-5601.

新竹廠 : 30076 新竹科學工業園區研發二路 17 號 2 樓 Tel: 03-666-3188 Fax: 03-666-9288.

E-mail: sales@lumtec.com.tw; Web: www.lumtec.com.tw

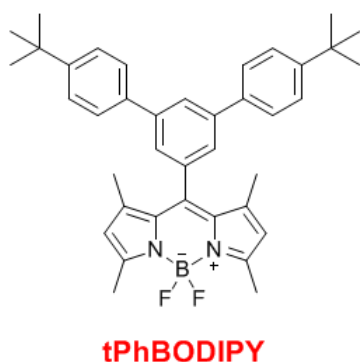


Luminescence Technology Corp.

Table 1. Summary of green OLEDs with FWHM <50 nm.

Ref.	Type	EQE [%]		PE [lm W ⁻¹]		Lifetime [h]	FWHM [nm]	CIE
		Max	1000 cd m ⁻²	Max	1000 cd m ⁻²			
D1	TSF	14.7	14.5	34.0	30.1	T50 = 2386 ^{a)}	32	(0.26, 0.67)
D2	TSF	19.0	18.9	85.7	78.3	T50 = 2947 ^{a)}	32	(0.26, 0.67)
[11a]	F	0.32	–	–	–	–	≈35	(0.27, 0.67)
[11b]	F	0.89	–	5.4	–	–	≈30	(0.40, 0.57)
[28]	F	9.9	–	26.2	–	T50 = 71 ^{b)}	≈30	(0.24, 0.62)
[26]	TADF	22.0	15.0	69.8	38.1	T90 = 4.76 ^{c)}	40	(0.16, 0.60)

^{a)}At 1000 cd m⁻²; ^{b)}At 23900 cd m⁻²; ^{c)}At 2000 cd m⁻².



*Figure reference: *Adv. Optical Mater.* 2020, 2000483. <https://doi.org/10.1002/adom.202000483>

Materials are used by qualified for testing and research only, there are not guaranteed in patent contention by customer use.

Head office : 31F-5, No. 99, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22175, Taiwan, R.O.C., TEL : ++886-2-2697-5600, FAX : ++886-2-2697-5601.

Factory : 2F, No. 17, R&D Road II, Science-Based Industrial Park, Hsin-Chu 30076, Taiwan, R.O.C., TEL: +886-3-666-3188, FAX: +886-3-666-9288.

總公司 : 22175 新北市汐止區新台五路一段 99 號 31 樓之 5 Tel: 02-2697-5600 Fax: 02-2697-5601.

新竹廠 : 30076 新竹科學工業園區研發二路 17 號 2 樓 Tel: 03-666-3188 Fax: 03-666-9288.

E-mail: sales@lumtec.com.tw; Web: www.lumtec.com.tw