



Summary of Thermally Activated Delayed Fluorescence (TADF) OLEDs

Researchers from Kyushu University that led by Chihaya Adachi developed one kind of new OLED light-emitting fluorescent materials with 100% internal quantum efficiency. They established light emission principle called thermally activated delayed fluorescence (TADF) and worked on designing a material to increase its luminous efficiency.

Now, there are more teams put their effort in this area, more references published and materials used. We can expect that will be great development in the future. Here, We summaries the literatures in recent years to understand TADF OLEDs development.

Short Name	Item No.	PL(nm)	CIE(x,y)	ΔE_{ST} (eV)	Max EQE(%)	Max current efficiency (cd/A)	Max power efficiency (lm/W)	Reference
TADF Blue Dopant Materials								
CZ-PS	LT-N672	404 nm (in Toluene)	0.15, 0.07	0.32	9.9	-	-	<i>J. Am. Chem. Soc.</i> 2012, 134, 14706–14709
2PXZ-TAZ	LT-N675	462 nm	0.16, 0.15	0.86	6.4	-	-	<i>J. Mater. Chem. C</i> , 2013, 1,4599
ACRSA	LT-N681	490 nm	-	0.04	16.5	-	-	<i>Chem. Commun.</i> , 2013, 49, 10385
CC2BP	LT-N684	475 nm	0.17, 0.27	0.14	14.3	25.5	-	<i>Angew. Chem.</i> 2014, 126, 6520–6524
DMAC-DPS	LT-N685	469 nm (in Toluene)	-	0.09	19.5	-	-	<i>Nature Photonics</i> 8, 326–332 (2014)
BDPCC-TPTA	LT-N686	463 nm (in Toluene)	0.19, 0.35	0.11	20.6	-	-	<i>Nature Materials</i> 14, 330-336 (2015)
BCC-TPTA	LT-N687	462 nm (in Toluene)	0.17, 0.27	0.19	16.8	-	-	<i>Nature Materials</i> 14, 330-336 (2015)
CC-TPTA	LT-N688	462 nm (in Toluene)	0.18, 0.28	0.29	14.6	-	-	<i>Nature Materials</i> 14, 330-336 (2015)
DCzTrz	LT-N689	449 nm (in Toluene)	0.15, 0.15	0.25	17.8	26.8	22.4	<i>Adv. Mater.</i> (2015), 27(15), 2515-2520
DDCzTrz	LT-N690	461 nm (in Toluene)	0.16, 0.22	0.27	18.9	26.2	31.3	<i>Adv. Mater.</i> (2015), 27(15), 2515-2520
DMOC-DPS	LT-N691	485 nm (in Toluene)	0.16, 0.16	0.21	14.5	24.0	-	<i>J. Mater. Chem. C</i> , 2014, 2, 421
CPC	LT-N695	474(toluene)	0.20,0.35	0.04	21.2	47.7	42.8	<i>ACS Appl. Mater. Interfaces</i> 2015, 7, 18930–18936
TCzTrz	LT-N696		0.18,0.33	0.16	25		42.7	<i>Adv. Mater.</i> 2015, 27, 5861–5867
DMAC-TRZ	LT-N699	425 nm (in Toluene)			26.5	66.8	65.6	<i>Chem. Commun.</i> , 2015, 51, 13662-13665
Cz-VPN	LT-N6001	440 nm (in Toluene)	0.15, 0.18	0.36	8.7	18	12.3	<i>Adv. Funct. Mater.</i> 2016, 26, 1813–1821.
4CZFCN	LT-N6005		0.16,0.25	0.06	20	36.1		<i>Adv. Funct. Mater.</i> 2015, 25, 6786–6792.
SpiroAc-TRZ	LT-N6006	480 nm(film)		0.072	36.7	94	98.4	<i>Adv. Mater.</i> (2016), 28(32), 6976-6983
TPXZPO	LT-N6007	478 nm(film)	0.17,0.20	0.11	15.3	26.4	23.6	<i>Chem. Mater.</i> 2016, 28, 5667–5679
MFAC-PPM	LT-N6013	458 nm (in Toluene)		0.25	20.4	41.7	37.2	<i>Chem. Sci.</i> , 2017, 8, 953–960
DMTDAc	LT-N6014		0.15,0.13		19.8	22.6	23.3	<i>Organic Electronics</i> (2016), 29, 160-164.
Cz-TRZ3	LT-N6016		0.148,0.098	0.17	19.2			<i>Angewandte Chemie, International Edition</i> (2017), 56, (6), 1571-1575
Cz-TRZ4	LT-N6017		0.15,0.097	0.15	18.3			<i>Angewandte Chemie, International Edition</i> (2017), 56, (6), 1571-1575
CzoB	LT-N6021	463 nm (in Toluene)	0.139,0.150		24.1			<i>ACS Appl. Mater. Interfaces</i> 2017, 9, 24035–24042
4TCzBN	LT-N6029		0.16,0.26		21.5		42	<i>Chemical Science</i> (2016), 7, (5), 3355-3363
TBPc	LT-E603	487 nm (in THF)	0.17, 0.30	-	8.7	18.0	7.0	<i>Nature Communications</i> (2014), 5, 4016
4CzFCN	CS10229	453 nm (film)	0.16,0.25		20	36.1		<i>Adv. Funct. Mater.</i> 2015, 25, 6786–6792
TADF Green Dopant Materials								
TTPA	LT-N507	554 nm (in CH ₂ Cl ₂)	0.29, 0.59	-	11.7	38.0	30.0	<i>Nature Communications</i> (2014), 5, 4016
2PXZ-OXD	LT-N528	502 nm (in Toluene)	0.28, 0.45	0.57	14.9	-	-	<i>J. Mater. Chem. C</i> , 2013, 1,4599
ACRXTN	LT-N532	530 nm (in CH ₂ Cl ₂)	0.29, 0.59	-	11.7	38.0	30.0	<i>Nature Communications</i> (2014), 5, 4016
DPAA-AF	LT-N536	499 nm (film)	-	0.021	9.6	-	-	<i>Chem. Lett.</i> 2014, 43, 1017–1019
AcPmBPX	LT-N538	490 nm (film)	-	0.05	10.3	23.4	-	<i>Dalton Transactions</i> (2015), 44(18), 8356-8359
PxPmBPX	LT-N540	530 nm (film)	-	0.02	11.3	35.3	-	<i>Dalton Transactions</i> (2015), 44(18), 8356-8359
DHPZ-2BI	LT-N541	550 nm (in CH ₂ Cl ₂)	-	0.19	12	-	-	<i>J. Mater. Chem. C</i> , 2015, 3, 2175
PXZ-DPS	LT-N545	507 nm (in Toluene)	-	0.08	17.5	-	-	<i>Nature Photonics</i> 8, 326–332 (2014)
3DPA3CN	LT-N547	506 nm (in CH ₂ Cl ₂)	-	0.103	21.4	-	-	<i>Chem. Commun.</i> , 2015, 51, 5028
TmCzTrz	LT-N548		0.25,0.50	0.07	25.5		52.1	<i>Adv. Mater.</i> 2015, 27, 5861–5867
Px-VPN	LT-N552	577 nm (in Toluene)	0.35, 0.57	0.08	14.9	45.4	26.7	<i>Adv. Funct. Mater.</i> 2016, 26, 1813–1821.
26PXZINN	LT-N563	551 nm (in Toluene)	0.37,0.58	0.06	22		99	<i>Chem. Asian J.</i> 2017, 12, 648-654

DMAC-BP	LT-N565		0.26,0.55		18.9		59	<i>Adv. Mater.</i> 2015, 27, 2096–2100
DBQ-3DMAC	LT-N566	536,548 nm		0.04	22.4	80.3	64.1	<i>J. Name.</i> , 2013, 00, 1-3
CzDBA	LT-N569	524 nm (in CBP film)	0.31,0.61		37.8	139.6	121.6	<i>Nature Photonics</i> 12, 235-240(2018)
tBuCzDBA	LT-N571	553 nm (in CBP film)	0.37,0.60		32.4	127.9	109.8	<i>Nature Photonics</i> 12, 235-240(2018)
TADF Red Dopant Materials								
TBRb	LT-N732	571 nm (in CH ₂ Cl ₂)	0.45, 0.53	-	17.2	56.0	33.0	<i>Nature Communications</i> (2014), 5, 4016
DBP	LT-N4003	610 nm (in THF)	0.61, 0.39	-	10.9	20.0	10.0	<i>Nature Communications</i> (2014), 5, 4016
TXO-TPA	LT-N775	625 nm (film)	0.45, 0.53	0.052	18.5	43.3	47.4	<i>Adv. Mater.</i> (2014), 26(30), 5198-5204
TXO-PhCz	LT-N776	570 nm (film)	0.31, 0.56	0.073	21.5	76.0	70.0	<i>Adv. Mater.</i> (2014), 26(30), 5198-5204
TPA-DCPP	LT-N782	810 nm(in CH ₂ Cl ₂)	0.70,0.29	0.13	9.6	7.4	6.8	<i>Angew. Chem.</i> 2015, 127, 13260–13264
Ac-CNP	LT-N793	570 nm (film)	0.47,0.51	0.09	13.3	38.1	26.1	<i>Adv. Funct. Mater.</i> 2016, 26, 1813–1821.

TADF Host Materials							
Name	Item No.	PL(nm)	Reference	Name	Item No.	PL(nm)	Reference
MCP	LT-E107	360 nm(in THF)	1. <i>J. Mater. Chem. C</i> , 2014, 2, 8191 2. <i>Chem. Commun.</i> , 2015, 51, 3181	mCPSOB	LT-N4112		<i>Organic Electronics</i> 16 (2015) 109-112
TcTa	LT-E207	385 nm(in THF)	<i>Nature Photonics</i> 8, 326–332 (2014)	3CzPFP	LT-N4114	412 nm(film)	<i>ACS Appl. Mater. Interfaces</i> 2015, 7, 9625–9629
CBP	LT-E409	369 nm(in THF)	<i>Nature Photonics</i> 8, 326–332 (2014)	3CN34BCz	LT-N4119		<i>ACS Appl. Mater. Interfaces</i> 2014, 6, 14874–14880
CzSi	LT-N484	354 nm(in CH ₂ Cl ₂)	1. <i>Adv. Mater.</i> (2014), 26(38), 6642-6646 2. <i>J. Am. Chem. Soc.</i> 2012, 134, 14706–14709	CzAcSF	LT-N4120	443,466 nm(in CH ₂ Cl ₂)	<i>Adv. Mater.</i> 2015, 27, 4358–4363
PPT	LT-N4006	351 nm(in CH ₂ Cl ₂)	<i>Appl. Phys. Lett.</i> 104, 233304 (2014)	SFXSPO	LT-N4123		<i>Adv. Mater.</i> 2016, 28, 3122-3130
PYD-2Cz	LT-N4072	373 nm (in THF)	<i>Chem. Mater.</i> 2013, 25, 3910–3920	CN-T2T	LT-N4124	420 nm(in CH ₂ Cl ₂)	<i>Appl. Mater. Interfaces</i> 2016, 8, 4811–4818.
DPEPO	LT-N4060	311 nm(in CH ₂ Cl ₂)	1. <i>Nature Materials</i> 14, 330–336 (2015) 2. <i>J. Am. Chem. Soc.</i> 2012, 134, 14706–14709	DPTPCz	LT-N4126		<i>Phys. Chem. Chem. Phys.</i> , 2012, 14, 14255–14261
DCzDCN	LT-N4098	324 nm (in THF)	<i>Adv. Mater.</i> (2014), 26(38), 4050-4055	Cz-m2Ph-TRZ	LT-N4133	361,410nm(toluene)	<i>J. Phys. Chem. C</i> , 2015, 119 (39), pp 22618–22624
TmPyPB	LT-N863	353 nm(in CH ₂ Cl ₂)	<i>Adv. Mater.</i> (2014), 26(30), 5198-5204	PrDPhAc	LT-N4140	495 nm(in CH ₂ Cl ₂)	<i>Chem. Commun.</i> , 2016, 52, 8149–8151
BCzTPA	LT-N4102	397 (film)	1. <i>Adv. Funct. Mater.</i> 2013, 23, 5550–5555 2. <i>Adv. Mater.</i> 2012, 24, 3212–3217 3. <i>J. Mater. Chem. C</i> , 2015, 3, 1700	3,5-2CzBN	LT-N4142		<i>Chem. Sci.</i> 2016, 7, 3355–3363
pCzB-2CN	LT-N4104	450 nm(in CH ₂ Cl ₂)	<i>Adv. Mater.</i> (2014), 26(30), 5198-5204	Tri-o-2PO	LT-N4146	450 nm(in CH ₂ Cl ₂)	<i>Adv. Funct. Mater.</i> 2016, 26, 7929–7936
mCzB-2CN	LT-N4105	450 nm(in CH ₂ Cl ₂)	<i>Adv. Mater.</i> (2014), 26(30), 5198-5204	mCPCN	LT-N4148	348,365 nm(in CH ₂ Cl ₂)	<i>Journal of Materials Chemistry</i> (2012), 22, (31), 16114-16120.
PPF	LT-N4106	440 nm(in CH ₂ Cl ₂)	<i>Chem. Commun.</i> , 2012, 48, 9580-9582	CzFCN	LT-N4149	357 nm(film)	<i>Adv. Funct. Mater.</i> 2013, 23, 3096–3105
pCzB-2CN	LT-N4104		<i>Appl. Mater. Interfaces</i> , 2015, 7 (4), pp 2899–2904	TcZCN	LT-N4150		<i>Advanced Optical Materials</i> (2016), 4, (8), 1281-1287
mCzB-2CN	LT-N4105		<i>Appl. Mater. Interfaces</i> , 2015, 7 (4), pp 2899–2904	DCb-PCz	LT-N4157	385 nm(film)	<i>ACS Appl. Mater. Interfaces</i> 2017, 9, 21346–21354
4CN34BCz	LT-N4121	401nm(toluene)	Synthetic Metals 209 (2015) 19–23	PhCz2BP	LT-N4161	438 nm (in Toluene)	<i>Adv. Funct. Mater.</i> 2018, 1707002

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