Luminescence Technology Corp.

2015 New Product Summary

OLED

LT-N4086	CBBPE	A diphenyl ether bridged, high triplet energy host material for blue phosphorescent organic light-emitting diodes
LT-N4088	BCzSCN	Bipolar host materials for high efficiency phosphorescent organic light emitting diodes: tuning the HOMO/LUMO levels without reducing the triplet energy in a linear system
LT-N4098	DCzDCN	A Universal Host Material for High External Quantum Efficiency Close to 25% and Long Lifetime in Green Fluorescent and Phosphorescent OLEDs
LT-N4099		Phenylcarbazole-dipyridyl triazole hybrid as bipolar host material for phosphorescent OLEDs
LT-N4101	POBPmDPA	Using an organic molecule with low triplet energy as a host in a highly efficient blue electrophosphorescent device
LT-N4102	BCzTPA	Extremely Low Operating Voltage Green Phosphorescent Organic Light-Emitting Devices
LT-S9156	TPDI	High hole mobility hole transport material for organic light-emittingdevices
LT-N889	Tm3PyP26PyB	Pyridine-Containing Electron-Transport Materials for Highly Effi cient Blue Phosphorescent OLEDs with Ultralow Operating Voltage and Reduced Effi ciency Roll-Off
LT-N890	B3PYPPM	Hybrid Heterocycle-Containing Electron-Transport Materials Synthesized by Regioselective Suzuki Cross-Coupling Reactions for Highly Efficient Phosphorescent OLEDs with Unprecedented Low Operating Voltage
LT-N891	B4PYPPyPM	
LT-N689	DCzTrz	Stable Blue TADF emitters for high efficiency and long lifetime
LT-N690	DDCzTrz	
LT-N177	PFN-OX	Highly Efficient Inverted Polymer Solar Cells Based on a Crosslinkable Water-/Alcohol-Soluble Conjugated Polymer Interlayer
LT-N679	Ir(tfpd)2pic	Highly efficient blue and white phosphorescent OLEDs based on an iridium Complex
LT-N4090	CMP	Solution-processible small-molecular host materials for high-performance phosphorescent organic light-emitting diodes
LT-N4104	pCzB-2CN	Systematic Control of Photophysical Properties of Host Materials For Quantum Efficiency above 25% in Green Thermally Activated Delayed Fluorescent Devices
LT-N4105	mCzB-2CN	Systematic Control of Photophysical Properties of Host Materials For Quantum Efficiency above 25% in Green Thermally Activated Delayed Fluorescent Devices
LT-N766	$Ir(2\text{-}BtcPh)_2(pic)$	Phosphorescent organic light-emitting diodes fabricated using iridium complexes with carbazole-based benzothiazole ligands
LT-N778	ED	New Area of Research in OLEDs-Aggregation-Induced Emission (AIE)
LT-N779	QM-5	
LT-N753	$Ir(MDQ)_2(acac)$	The red dopant material Ir(MDQ)2(acac) was used in several high performance luminescence devices
LT-N4107		A new tricarbazole phosphine oxide bipolar host for efficient Blue PhOLED
LT-N4116		Highly efficient orange and deep-red organic light emitting diodes with long operational lifetimes using carbazole–quinoline based bipolar host material

OPV

LT-S9122	DTDCPB	Vacuum-Deposited Small-Molecule Organic Solar Cells with High Power Conversion Efficiencies by Judicious Molecular Design and Device Optimization
LT-S9166	WS-2	Indoline Dyes for High Efficient Dye-Sensitized Solar-Cell (DSSC)
LT-S9167	WS-5	
LT-S9168	IQ-4	
LT-S9161		Modification for Highly Efficient Organic-Inorganic Perovskite Solar Cells

OTFT

LT-S9077	BOBTP	High-Mobility Pyrene-Based Semiconductor for Organic Thin-Film Transistors

Perovskite

LT-S9145	p,m-Spiro-MeOTAD	o-Methoxy Substituents in Spiro-OMeTAD for Efficient Inorganic Organic Hybrid Perovskite Solar Cells
LT-S9146	p,o-Spiro-MeOTAD	

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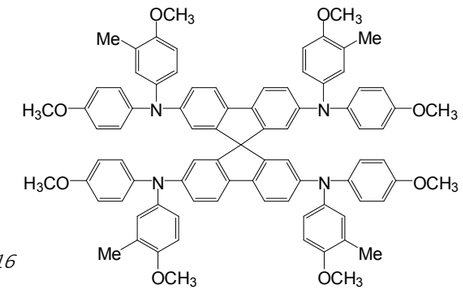
Luminescence Technology Corp.

Enhancing Thermal Stability and Lifetime of Solid-State Dye-Sensitized Solar Cells via Molecular Engineering of the Hole-Transporting Material Spiro-MeOTAD

Product Specifications

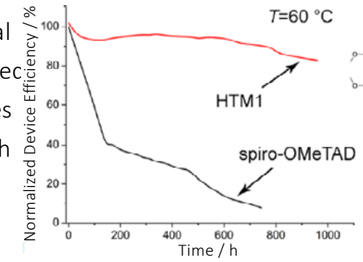
LT-S9170 Spiro-MeOTAD-HTM1

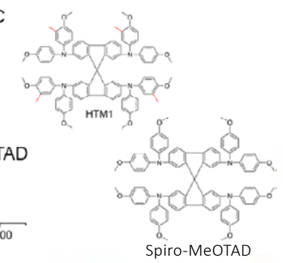
CAS No. 1573202-31-9
Grade > 99% (HPLC)
Formula $C_{85}H_{76}N_4O_8$
Molecular Weight 1281.53 g/mole
Absorption 306, 385 nm(in CH_2Cl_2)
Photoluminenscence 429 nm(in CH_2Cl_2)
Reference : ACS Appl. Mater. Interfaces 2015, 7, 11107−11116



Features

- The fully symmetrical Spiro-MeOTAD is prone to crystallization, especially if processed from solution.
- Spiro-MeOTAD-HTM1, analogue with four additional strategically well-placed methyl groups, have demonstrated significantly improved lifetime at elevated temperatures and retained ~90% of their initial efficiency after 1000 h at 60 °C.
  *Figure reference: ACS Appl. Mater. Interfaces

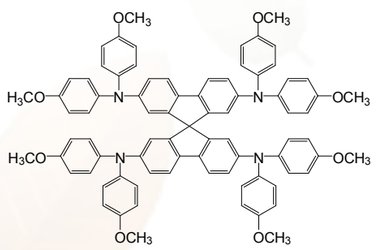




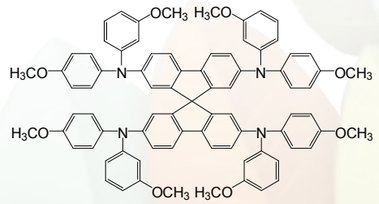
Device Application

The Best Device :
FTO/ TiO_2 layer/ Spiro-MeOTAD-HTM1 (200 nm)/ Ag (200 nm)

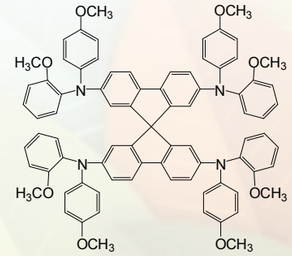
Related products from Lumtec :



LT-S922 Spiro-MeOTAD



LT-S9145 p,m-Spiro-MeOTAD



LT-S9146 p,o-Spiro-MeOTAD

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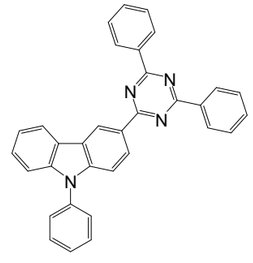
Lumtec Luminescence Technology Corp.

Bipolar host materials based on 1,3,5-triazine derivatives for highly efficient phosphorescent OLEDs

Product Specifications

CS10214 DPTPCz



CAS No.	1313391-57-9
Grade	Sublimed, > 99% (HPLC)
Formula	$C_{33}H_{22}N_4$
Molecular Weight	474.55 g/mole
Absorption	305, 353 nm(in ethyl acetate)
Photoluminenscence	416 nm(in ethyl acetate)
HOMO/LUMO	5.69 eV/2.67 eV

Reference : Phys. Chem. Chem. Phys., 2012, 14, 14255–14261

Features

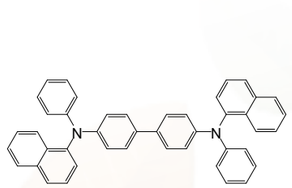
- Bipolar host materials, DPTPCz, with high triplet energy levels of 2.78eV for PhOLEDs.
- The phosphorescent devices based on DPTPCz exhibit maximum external quantum efficiencies of 14.4% (for blue device) and 21.2% (for green device), and maintain high efficiencies of 11.9% and 20.0% even at a high luminance of 10,000 cd/m^2.

Device Application

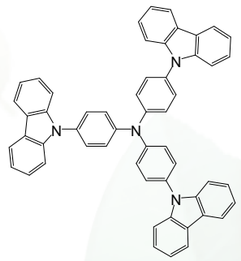
The Best Device :

ITO/NPB (30 nm)/TcTa (10 nm)/12 wt% FIrPic: DPTPCz (30 nm)/TAZ (30 nm)/LiF (1 nm)/Al

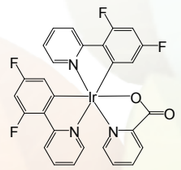
Related products from Lumtec :



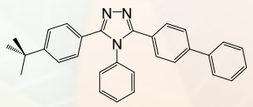
LT-E101 NPB



LT- E207 TcTa



LT-E607 FIrPic



LT-N836 TAZ

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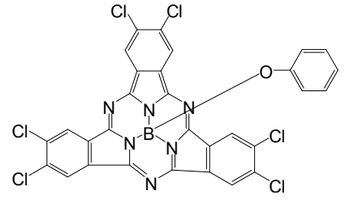
E-mail : sales@lumtec.com.tw ; Web : http://www.lumtec.com.tw

Lumtec Luminescence Technology Corp.

Solution-processed boron subphthalocyanine derivatives as acceptors for organic bulkheterojunction solar cell

Product Specifications

LT-S9181 PhO-BsubPc



CAS No.	1309390-01-9
Grade	> 99% (HPLC)
Formula	$C_{30}H_{11}BCl_6N_6O$
Molecular Weight	694.98 g/mole
Absorption	267, 318, 569 nm (in $CHCl_3$)
HOMO/LUMO	-5.8eV/-3.0eV

Reference : Journal of Materials Chemistry A: Materials for Energy and Sustainability (2015), 3(14), 7345-7352

Features

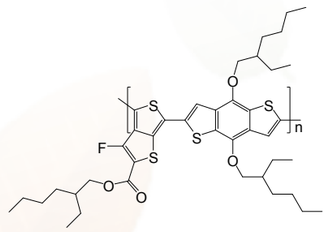
- Solution-processed bulk heterojunction devices from subphthalocyanine derivatives as the acceptor component.
- The high solubility of the SubPC derivatives facilitated the formation of efficient donor/acceptor networks and provided power conversion efficiencies of 0.4% with MEH-PPV, 1.1% with P3HT and 3.5% with PTB7.
- Solution-processable SubPC are a promising alternative to fullerenes for polymer solar cell.

Device Application

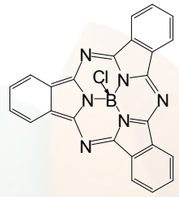
The Best Device :

ITO/PEDOT:PSS/PTB7: PhO-BsubPc/Ca(20 nm)/Al(100 nm)

Related products from Lumtec :



LT-S9050 PTB7



LT- S943 SubPC

Al

LT-E005 Al

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

Lumtec Luminescence Technology Corp.

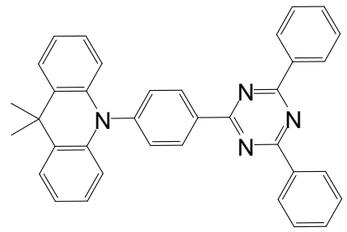
A versatile thermally activated delayed fluorescence emitter for both highly efficient doped and non-doped organic light emitting devices

Product Specifications

LT-N699 DMAC-TRZ

CAS No.	1628752-98-6
Grade	Sublimed, > 99% (HPLC)
Formula	$C_{36}H_{28}N_4$
Molecular Weight	516.63 g/mole
Absorption	390 nm(in Toluene)
Photoluminenscence	425 nm(in Toluene)
HOMO/LUMO	-5.30 eV/-2.78 eV

Reference : Chem. Commun., 2015, 51, 13662-13665



Features

- The emitter as the emitting dopant in a host or as the non-doped emitting layer achieves high EL EQEs of up to 26.5% and 20% in OLEDs.
- The emitter not only shows high PLQY (≥90%) in doped film but also possesses low concentration quenching and high PLQY (83%) in neat film.
- It's versatile for application in different device configurations for achieving high efficiency, device simplification, and cost reduction.

Device Application

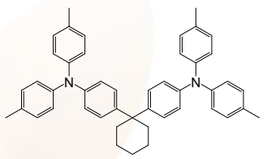
The doped Device :

ITO anode/ PEDOT: PSS (70 nm)/ TAPC (15 nm)/ MCP (5 nm)/ mCPCN:DMAC-TRZ 8 wt% (20 nm)/ DPPS (5 nm)/ 3TPYMB (45 nm)/ LiF (0.5 nm)/ Al (150 nm).

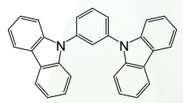
The non-doped Device :

ITO anode/ PEDOT: PSS (70 nm)/ TAPC (10 nm)/ MCP (10 nm)/ DMAC-TRZ (20 nm)/ DPPS (5 nm)/ 3TPYMB (45 nm)/ LiF (0.5 nm)/ Al (150 nm).

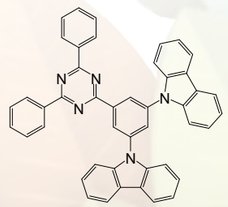
Related products from Lumtec :



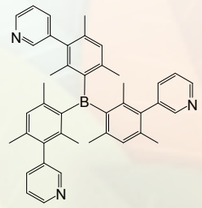
LT-N137 TAPC



LT-E107 MCP



LT-N689 DPPS



LT-N856 3TPYMB

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Lumtec Luminescence Technology Corp.

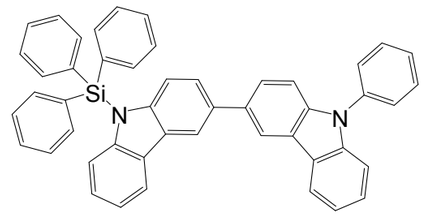
Efficient blue/white phosphorescent orangic light-emitting diodes based on a silicon-based host material via a direct carbon-nitrogen bond

Product Specifications

LT-N4122 BCz-Si 9-Phenyl-9'-(triphenylsilyl)-9*H*,9'*H*-3,3'-bicarbazole

CAS No.	1770916-57-8
Grade	Sublimed, >99 % (HPLC)
Formula	$C_{48}H_{34}N_2Si$
Molecular Weight	666.88 g/mole
Absorption	245, 350 nm(in CH_2Cl_2)
Photoluminenscence	401 nm(in CH_2Cl_2)
HOMO/LUMO	-5.62 eV/-2.3 eV
Tg	130 °C
TGA	> 250 °C (0.5 % weight loss)

Reference : J. Mater. Chem. C, 2015, 3, 5347-5353



Features

- The high triplet energy of BCz-Si ensures efficient energy transfer from the host to the triplet emitter FIrPic. The blue device using BCz-Si as a host material achieved a maximum quantum efficiency of 21.0%, a current efficiency and power efficiency as high as 46.5 cdA^{-1} and 45.8 lmW^{-1}.
- The warm-white OLED by current efficiency of BCz-Si-based device can reach as high as 70.5 cdA^{-1} for two color-based WOLED and 50.1 cdA^{-1} for three color-based WOLED.

Device Application

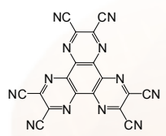
The Best Blue Device :

ITO/HAT-CN(10 nm)/TAPC(40 nm)/BCz–Si:FIrPic(5 wt%, 20 nm)/TmPyPB(45 nm)/Liq(2 nm)/Al(120 nm)

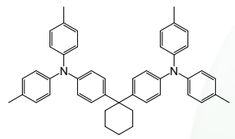
The Best White Three Color-based Device :

ITO/HAT-CN(10 nm)/TAPC(45 nm)/BCz–Si:FIrPic:PO-01(8%, 0.5%, 20 nm)/TmPyPB(45 nm)/Liq(2 nm)/Al(120 nm)

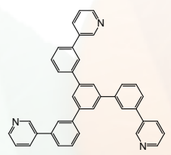
Related products from Lumtec :



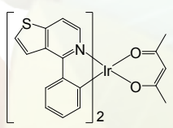
LT-N221 HAT-CN



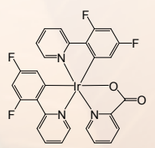
LT- N137 TAPC



LT-N863 TmPyPB



LT-N748 PO-01



LT-E607 FIrPic

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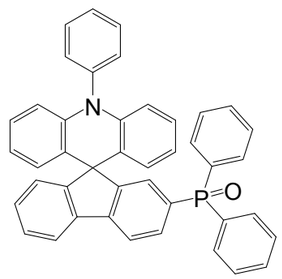
Lumtec Luminescence Technology Corp.

Orthogonal Molecular Structure for Better Host Material in Blue Phosphorescence and Large OLED White Lighting Panel

Product Specifications

LT-N4108 POSTF 2'-(diphenylphosphoryl)-10-phenyl-10*H*-spiro[acridine-9,9'-fluorene]

CAS No.	1647050-25-6
Grade	Sublimed, >99% (HPLC)
Formula	$C_{43}H_{30}NOP$
Molecular Weight	638.65 g/mole
Absorption	280, 325 nm(in CH_2Cl_2)
Photoluminenscence	435 nm(in CH_2Cl_2)
HOMO/LUMO	5.34 eV/ 1.71 eV
TGA	> 250 °C (0.5 % weight loss)



Reference : Adv. Funct. Mater. 2015, 25, 645-650

Features

- The high-efficiency blue phosphorescence devices with external quantum efficiencies above 25% are developed using a new bipolar host material, POSTF, which is constructed in orthogonal molecular structure with a spiro-coree.
- PHOLED device with FIrPic as dopant, the device can achieve power efficiency of 50.5 lmW^{-1}, EQE of 26.8%.
- The large-size white lighting prototype device with active area of 150 mm × 150 mm. In this device, a PE of 63.9 lmW^{-1} was achieved. By applying state-of-the-art out-coupling technique, this PE can be further improved as high as 75.9 lmW^{-1}.

Device Application

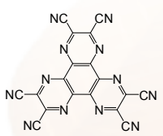
The Best Blue Device :

ITO/HAT-CN(10 nm)/ TAPC(45 nm)/POSTF:FIrPic (15 vol%, 20 nm)/TmPyPB (40 nm)/Liq(2 nm)/Al(100 nm).

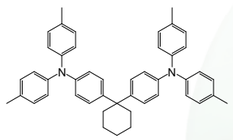
The Best White Three Color-based Device :

ITO/HAT-CN(10 nm)/TAPC(45 nm)/POSTF:15 vol% FIrPic:1 vol% PO-01(20 nm)/TmPyPB (40 nm)/ Liq (2 nm)/Al.

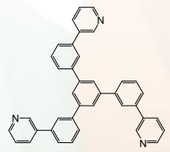
Related products from Lumtec :



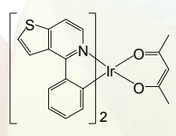
LT-N221 HAT-CN



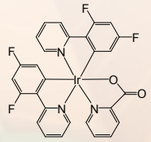
LT- N137 TAPC



LT-N863 TmPyPB



LT-N748 PO-01



LT-E607 FIrPic

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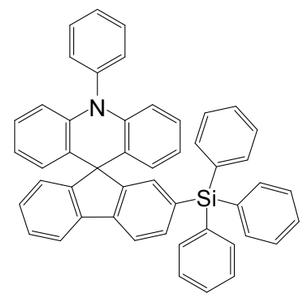
Lumtec Luminescence Technology Corp.

Silicon-Based Material with Spiro-Annulated Fluorene/Triphenylamine as Host and Excition-Blocking Layer for Blue PhOLED

Product Specifications

LT-N4110 SSTF 10-Phenyl-2'-(triphenylsilyl)-10*H*-spiro[acridine-9,9'-fluorene]

CAS No.	1454372-37-2
Grade	Sublimed, > 99% (HPLC)
Formula	$C_{49}H_{35}NSi$
Molecular Weight	665.89 g/mole
Absorption	285, 313 nm(in CH_2Cl_2)
Photoluminenscence	413 nm(in CH_2Cl_2)
Eg	3.81 eV
Tg	109 °C
TGA	>270 °C (0.5 % weight loss)



Reference : Chem. Eur, J. 2013, 19, 11791-11797

Features

- The compound SSTF, with spiro structure that the energy levels make it suitable as a host material or exciton-blocking material in PhOLEDs.
- The blue emitting device with FIrPic as phosphorescent dopant have been show high efficiency with low roll-off.

  A. When SSTF as host material, the device achieved 44.0 cdA^{-1} (41.3 lmW^{-1}) at 100 cdm^{-2} and 41.9 cdA^{-1} (32.9 lmW^{-1}) at 1000 cdm^{-2}.

  B. When SSTF as exciton-blocking layer material, the device achieved 28.1 lmW^{-1} at 100 cdm^{-2} and 20.6 lmW^{-1} at 1000 cdm^{-2}.

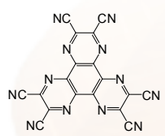
Device Application

The Best Blue Device :

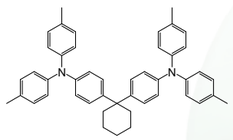
A. ITO/HAT-CN(10 nm)/TAPC(40 nm)/SSTF: FIrPic(15 wt%, 20 nm)/TmPyPB(40 nm)/Liq(2 nm)/Al(100 nm).

B. ITO/HAT-CN(10 nm)/NPB(80 nm)/SSTF(15 nm)/MCP:FIrPic(8 wt%, 20 nm)/TmPyPB(40 nm)/Liq(2 nm)/Al(100 nm).

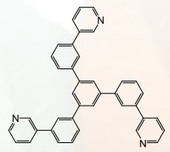
Related products from Lumtec :



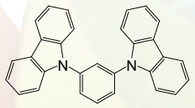
LT-N221 HAT-CN



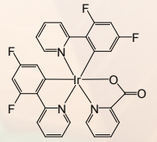
LT- N137 TAPC



LT-N863 TmPyPB



LT-E107 MCP



LT-E607 FIrPic

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Luminescence Technology Corp.

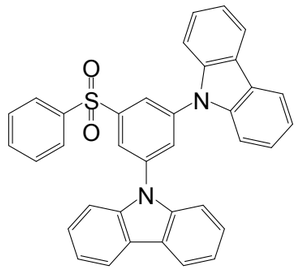
High efficient OLED from thermally activated delayed fluorescence using a sulfone-carbazole host material

Product Specifications

LT-N4112 mCPSOB 3,5-Di(carbazol-9-yl)-1-phenylsulfonylbenzene

CAS No.	1374770-41-8
Grade	Sublimed, > 99% (HPLC)
Formula	$C_{36}H_{24}N_2O_2S$
Molecular Weight	548.65 g/mole
HOMO/LUMO	-5.8 eV/-2.5 eV
Tg	110°C
TGA	> 200°C (0.5 % weight loss)
Triplet Energy	3.02 eV

Reference : Organic Electronics 16 (2015) 109-112



Features

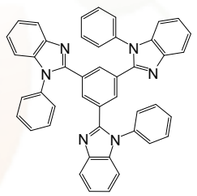
- The host material mCPSOB device showed high performance with a maximum EQE of 26.5% at 10 cd/m^2 and 21.5% at 1000 cd/m^2.
- The device exhibited a low turn-on voltage of 3.2 V at 10 cd/m^2 as well as reduced efficiency roll-off at high current density.

Device Application

The Best Device :

ITO/MoO_3(15 nm)/Poly-TriCZ(50 nm)/mCPSOB:4CzIPN(5 wt%,25 nm)/TPBi(60 nm)/LiF(1 nm)/Al(100 nm).

Related products from Lumtec :



LT-E302 TPBi

MoO_3

LT-E003 MoO_3

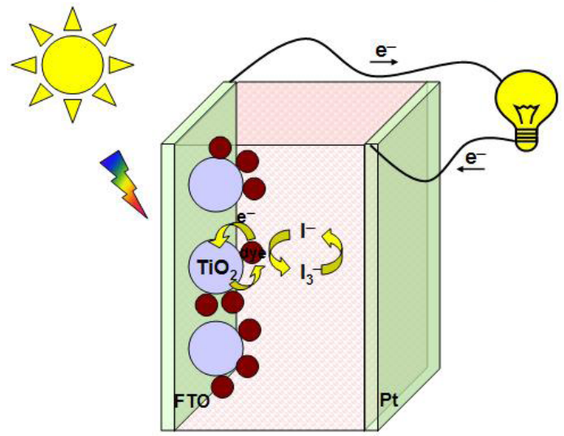
LiF

LT-N863 LiF

Luminescence Technology Corp.

Redox Couple Electrolytes Materials

Dye-sensitized solar cell (DSSC) is one of the alternatives for global energy in recent years. It has attracted much attention for the next-generation photovoltaic (PV) devices over conventional silicon based solar cells. Basically the components of DSSC device consist of a porous layer of titanium dioxide nano-particles covered by a molecular dye, a redox couple, and a metal-based (Pt) counter electrode. Among all these components, the redox couple is the critical factor to achieve high efficiency and durability.



Device structure of Dye –Sensitized Solar Cells

Recently, the power conversion efficiency (PCE) has risen up to 13% by using cobalt redox couple[1]. In DSSC, the redox electrolyte is not only produced by the oxidized sensitizer but also acts as an electrically conducting medium. Electrolytes have three groups: liquid electrolyte, quasi-solid electrolyte and solid electrolyte. Liquid electrolyte is commonly used in the most of DSSCs. The redox couple is the key component in a liquid electrolyte and it has some vital requirements[2]:

1. *The redox potential should be less negative than the oxidized level of a dye molecule.*
2. *Slow electron recombination kinetics as the interface.*
3. *Slight visible-light absorption.*
4. *Fast electron-transfer (ET) kinetics at counter electrode.*
5. *Good photochemical stability.*

The $I^-/I3^-$ is a typically redox couple in DSSCs device for many years. But it has certain constraints. Comparing to the sensitizer oxidation potential (E^0= ~1.0V vs NHE), The $I^-/I3^-$ oxidation potential (E^0= 0.35V vs NHE) has large difference. Additional drawbacks of the $I^-/I3^-$ redox couple are the absorption of tri-iodide up to 430 nm and the volatile of iodine, so the alternative redox couples also have been studied for DSSCs. The transition-metal-based redox is also investigated, including ferrocene/ferrocenium, copper(I/II), cobalt(I/II), nickel(III/IV) complexes.

1. *S. Mathew, A. Yella, P. Gao, R. Humphry-Baker, B. F. E. Curchod, N. Ashari-Astani, I. Tavernelli, U.Rothlisberger, M. K. Nazeeruddin, M. Grätzel, Nat. Chem. 2014, 6, 242-247.*
2. *Lingamallu Giribabu, Ramababu Bolligarla, Mallika Panigrahi, Chem. Rec. 2015, 15, 4, 760-788.*

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Lumtec Luminescence Technology Corp.

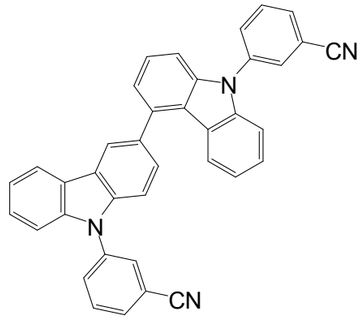
Engineering of Interconnect Position of Bicarbazole for High EQE in Green and Blue PHOLEDs

Product Specifications

LT-N4119 3CN34BCz 3,3'-(9*H*,9'*H*-3,4'-bicarbazole-9,9'-diyl)dibenzonitrile

CAS No.	1622297-83-9
Grade	Sublimed, >99 % (HPLC)
Formula	$C_{38}H_{22}N_4$
Molecular Weight	534.61 g/mole
Photoluminescence	404 nm (in CH_2Cl_2)
Tg	132 °C
TGA	> 260 °C (0.5 % weight loss)
Triplet Energy	2.98 eV

Reference : ACS Appl. Mater. Interfaces 2014, 6, 14874−14880



Features

- The bicarbazole 3CN34BCz host material showed good device performance and high quantum efficiency above 25% for green and blue PHOLEDs.
- The bicarbazole host material with a linkage via 4-position showed highest quantum efficiency upon 30.4% in the green device, and increased the IP-EA gap and triplet energy of the host material, and reduced current density of the device.

Device Application

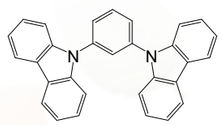
The Best Green Device :

ITO/ PEDOT:PSS (60 nm)/ TAPC (20 nm)/ MCP (10 nm)/ fac-Ir(ppy)$_3$: 3CN34BCz (5 wt%, 25 nm)/ TSPO1 (35 nm)/ LiF (1 nm)/ Al (200 nm).

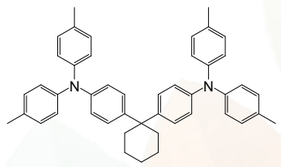
The Best Blue Device :

ITO/ PEDOT:PSS (60 nm)/ TAPC (20 nm)/ MCP (10 nm)/ FIrPic: 3CN34BCz (5 wt%, 25 nm)/ TSPO1 (35 nm)/ LiF (1 nm)/ Al (200 nm).

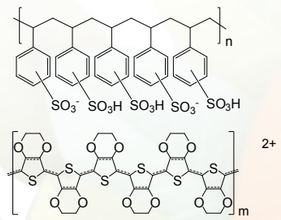
Related products from Lumtec :



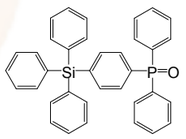
LT-E107 mCP



LT-N137 TAPC

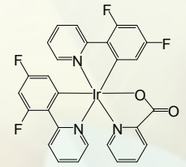


LT-PS001 PEDOT:PSS



LT-N4048 TSPO1

LT-E504 fac-Ir(ppy)$_3$



LT-E607 FIrPic

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Lumtec Luminescence Technology Corp.

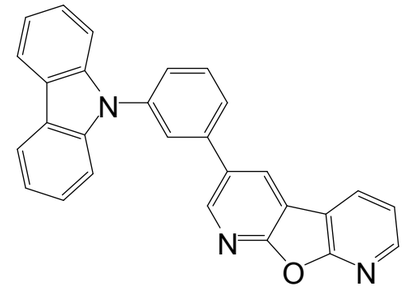
Above 30% External Quantum Efficiency in Green Delayed Fluorescent OLEDs

Product Specifications

LT-N4114 3CzPFP 3-[3-(9*H*-carbazol-9-yl)phenyl]furo[2,3-b:5,4-b']dipyridine

CAS No.	1443793-91-6
Grade	Sublimed, >99% (HPLC)
Formula	$C_{28}H_{17}N_3O$
Molecular Weight	411.45 g/mole
Photoluminescence	412 nm (in CH_2Cl_2)
HOMO/LUMO	-6.08 eV/-3.06 eV
TGA	> 280 °C (0.5 % weight loss)
Triplet Energy	2.82 eV

Reference : ACS Appl. Mater. Interfaces 2015, 7, 9625−9629



Features

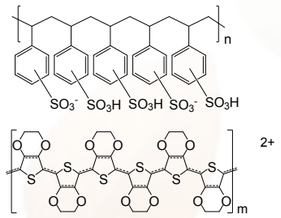
- The high efficient green TADF OLEDs with an external quantum efficiency of 31.2% were investigated by using 3CzPFP derived from carbazole and pyrido[3',2': 4,5]furo-[2,3-b]pyridine.
- The green delayed fluorescence device employing the 3CzPFP host showed high maximum quantum efficiency of 31.2±0.5% at 1% doping after optimization of the device structure.
- The TADF OLEDs was found to have an efficiency comparable to that of phosphorescent OLEDs, and the device was promising as high-efficiency OLEDs to improve the power consumption.

Device Application

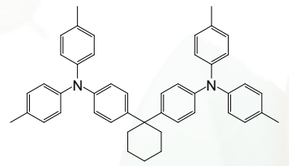
The Best Device :

ITO/ PEDOT:PSS/ TAPC/ MCP/ 3CzPFP: 4CzIPN (1 %)/ TSPO1.

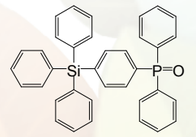
Related products from Lumtec :



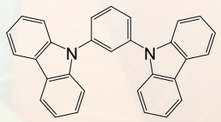
LT-PS001 PEDOT:PSS



LT-N137 TAPC



LT-N4048 TSPO1



LT-E107 mCP

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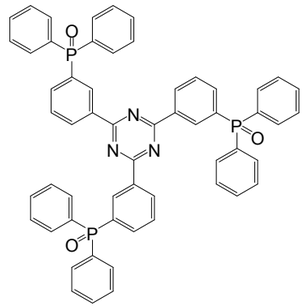
Lumtec Luminescence Technology Corp.

An Exciplex Forming Host for Highly Efficient Blue OLEDs with Low Driving Voltage

Product Specifications

CS10199 PO-T2T 2,4,6-Tris[3-(diphenylphosphinyl)phenyl]-1,3,5-triazine

CAS No.	1646906-26-4
Grade	Sublimed, >99% (HPLC)
Formula	$C_{57}H_{42}N_3O_3P_3$
Molecular Weight	909.8 g/mole
Absorption	272 nm(in CH_2Cl_2)
Photoluminenscence	295, 379 nm(in CH_2Cl_2)
HOMO/LUMO	-6.64/-3.34 eV



Reference : 1. Adv. Funct. Mater. 2015, 25, 361-366
2. Scientific Reports 5:10234(2015)
3. J. Mater. Chem. C, 2015, 3, 4890-4902

Features

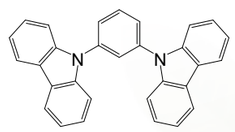
- PO-T2T was developed as an ETL of the FIrPic-based blue phosphorescent OLEDs.
- An unprecedented high performance blue PhOLED showing maximum external quantum efficiency of 30.3%, a maximum power efficiency of 66 lm/W, and low driving voltage of 2.75 at 100 cd/m^2, 3.29 V at 1000 cd/m^2, and 4.65 V at 10000 cd/m^2, respectively.

Device Application

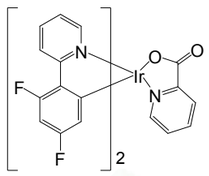
The Best Device 1:
ITO(70 nm)/6% ReO_3:MCP(45 nm)/MCP(15 nm)/MCP:PO-T2T:10% FIrPic(30 nm)/PO-T2T(20 nm)/4% Rb_2CO_3:PO-T2T(25 nm)/ Al(100 nm).

The Best Device 2:
ITO/MoO_3(3 nm)/m-CBP(20 nm)/m-CBP:PO-T2T:Ir(BT)$_2$(acac)(0.5%)(20 nm)/PO-T2T(40 nm)/LiF(0.8 nm)/Al.

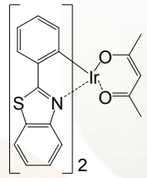
Related products from Lumtec :



LT-E107 MCP



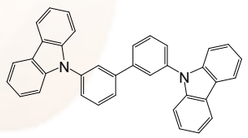
LT-E607 FIrPic



LT-N733 Ir(BT)$_2$(acac)

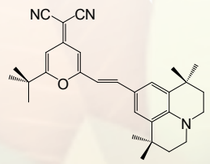
Al

LT-E005 Al



LT-N4069 m-CBP

LT-E707 Rubrene



LT-E704 DCJTB

MoO_3

LT-E003 MoO_3

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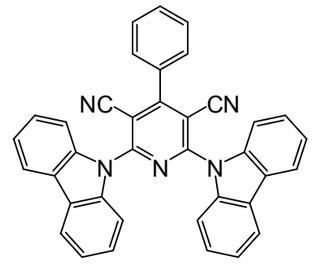
Lumtec Luminescence Technology Corp.

Novel Carbazol-Pyridine-Carbonitrile Derivative as Excellent Blue TADF Emitter for Highly Efficient OLEDs

Product Specifications

LT-N695 CPC 2,4,6-Tris[3-(diphenylphosphinyl)phenyl]-1,3,5-triazine

CAS No.	1803330-63-3
Grade	Sublimed, >99 % (HPLC)
Formula	$C_{37}H_{21}N_5$
Molecular Weight	535.60 g/mole
Photoluminescence	474 nm (in Toluene)
HOMO/LUMO	-6.25V/-3.47V
TGA	>280 °C (0.5 % weight loss)



Reference : ACS Appl. Mater. Interfaces 2015, 7, 9625−9629

Features

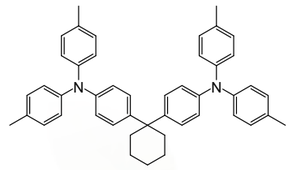
- The optimized OLED based on 13 wt % CPC doped in MCP host exhibits maximum current efficiency, power efficiency, and EQE of 47.7 cd A^{-1}, 42.8 lm W^{-1}, and 21.2%, respectively, which are the best results in reported blue TADF-based devices.
- The CPC emitter successfully achieves both extremely small ΔE_{ST} (0.04 eV) and fairish PLQY.

Device Application

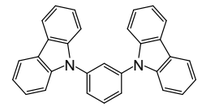
The Best Device:
ITO/ TAPC (30 nm)/ TcTa (10 nm)/ MCP (10 nm)/ CPC: DPEPO (15 wt%, 10 nm)/ DPEPO (10 nm)/ TPBi (30 nm)/ LiF (0.8 nm)/ Al.

The Best Device 2:
ITO/ TAPC (40 nm)/ TcTa (5 nm)/ CPC: 26DCZPPY (10 wt%, 10 nm)/ TmPyPB (50 nm)/ LiF (0.8 nm)/ Al.

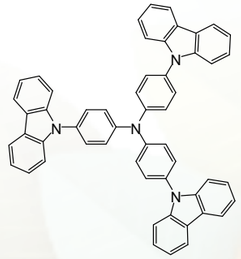
Related products from Lumtec :



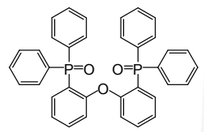
LT- N137 TAPC



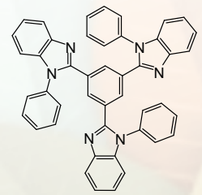
LT-E107 MCP



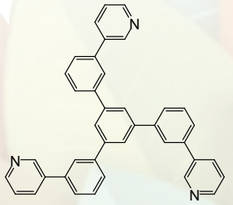
LT-E207 TcTa



LT-N4060 DPEPO



LT-E302 TPBi



LT-N863 TmPyPB

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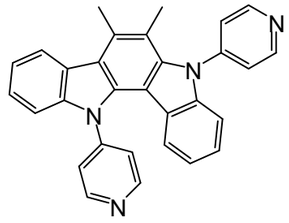
Lumtec Luminescence Technology Corp.

m-Indolocarbazole Derivative as an Universal Host Material for RGB and White Phosphorescent OLEDs

Product Specifications

LT-N4113 4ICDPy Indolo[3,2-a]carbazole,5,12-dihydro-6,7-dimethyl-5,12-di-4-pyridinyl

CAS No.	1803246-66-3
Grade	Sublimed, >99 % (HPLC)
Formula	$C_{30}H_{22}N_4$
Molecular Weight	438.52 g/mole
Photoluminescence	430 nm (in CH_2Cl_2)
HOMO/LUMO	-5.47 eV/-2.17 eV
Tg	114 °C



Reference : Adv. Funct. Mater. 2015

Features

- This material of 4-pyridyl group renders good thermal stability, homogeneous morphology, and balanced carrier transporting ability without significantly lowering their triplet energy level.
- The two-color, single-host white device using 4ICDPy as the host exhibits superior EL performance and color stability with EQE of 20.3% and PE of 50.9 lm W^{-1}.
- The device with 4ICDPy shows low turn-on voltage and low efficiency roll-off at high luminance. This finding is an effective approach to design the universal host material for highly efficient RGB PhOLEDs and WOLEDs.

Device Application

The White Device:

ITO/ NPB (10 nm)/ TAPC (20 nm)/ 4ICDPy: 10% FIrpic: 0.2% Ir(piq)3 (30 nm)/ TPBi (50 nm)/LiF (1 nm)/Al (100 nm).

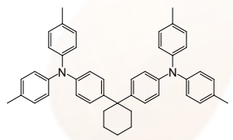
The Blue, green and red Devices:

ITO/ TAPC (50 nm)/ ICDP (10 nm)/ Host: FIrPic (8 %, 30 nm)/ 3TPYMB (5 nm)/ BCP (40 nm)/ LiF (1 nm)/ Al (100 nm).

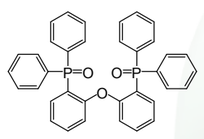
ITO/ NPB (10 nm)/ TAPC (20 nm)/ Host: fac-Ir(ppy)3 (6%, 25 nm)/ TPBi (60 nm)/ LiF (1 nm)/ Al (100 nm).

ITO/ NPB (15 nm)/ TcTa (10 nm)/ Host: (piq)2Ir(acac) (4%, 25 nm)/ BCP (10 nm)/Alq3 (50 nm)/ LiF (1 nm)/ Al (100 nm).

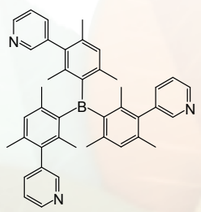
Related products from Lumtec :



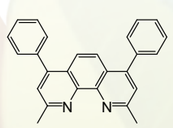
LT- N137 TAPC



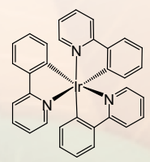
LT-E607 FIrPic



LT-N856 3TPYMB



LT-E304 BCP



LT-E504 fac- $Ir(ppy)_3$

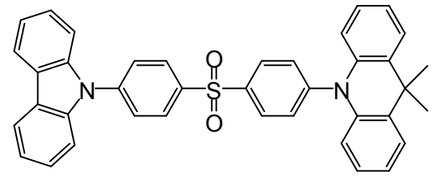
Lumtec Luminescence Technology Corp.

Host Engineering for High Quantum Efficiency Blue and White Fluorescent OLEDs

Product Specifications

LT-N4120 CzAcSF 10-(4-(4-(9*H*-carbazol-9-yl)phenylsulfonyl)phenyl)-9,9-dimethyl-9,10-dihydroacridine

CAS No.	1792173-34-2
Grade	Sublimed, >99 % (HPLC)
Formula	$C_{39}H_{30}N_2O_2S$
Molecular Weight	590.73 g/mole
Photoluminescence	443, 466 nm (in CH_2Cl_2)
HOMO/LUMO	-5.89 eV/-3.00 eV
Tg	117 °C
Triplet Energy	3.04 eV



Reference : ACS Appl. Mater. Interfaces 2015, 7, 9625−9629

Features

- The high quantum efficiency blue and white fluorescent OLEDs with external quantum efficiencies of 15.4% and 14.0% are develop by doping fluorescent emitters in the TADF type CzAcSF host material.
- The development of high efficiency single layer TADF device and the use of the TADF material as the host of a fluorescent dopant can boost the quantum efficiency of the blue and white fluorescent devices above 20%.

Device Application

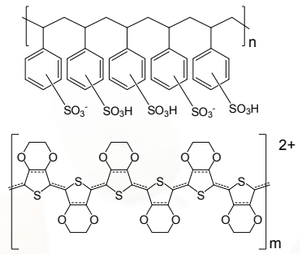
The Blue Device:

ITO/PEDOT:PSS(60 nm)/MCP(30 nm)/CzAcSF: 0.3%TBPe(25 nm)/TSPO1(5 nm)/TPBi(30 nm)/LiF(1 nm)/Al(200 nm).

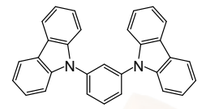
The White Device:

ITO/PEDOT:PSS(60 nm)/MCP(30 nm)/CzAcSF:0.3%TBPe:0.4%TBRb(25 nm)/TSPO1(5 nm)/TPBi(30 nm)/LiF(1 nm)/Al(200 nm).

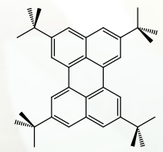
Related products from Lumtec :



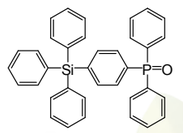
LT-PS001 PEDOT:PSS



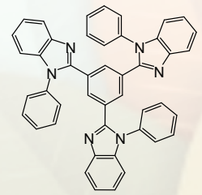
LT-E107 MCP



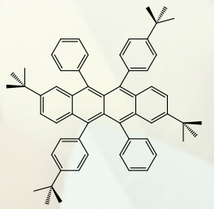
LT-E603 TBPe



LT-N4048 TSPO1



LT-E302 TPBi



LT-N732 TPRb

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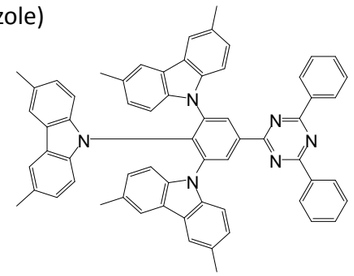
Design Strategy for 25% EQE in Green and Blue TADF devices

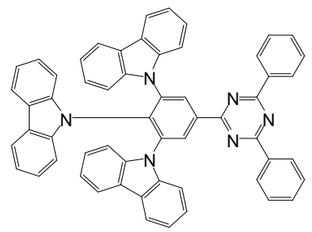
Product Specifications

LT-N548 TmCzTrz 9,9',9''-(5-(4,6-diphenyl-1,3,5-triazin-2-yl)benzene-1,2,3-triyl) tris(3,6-dimethyl-9*H*-carbazole)



CAS No.	1808158-41-9
Grade	Sublimed, >99% (HPLC)
Formula	$C_{63}H_{48}N_6$
Molecular Weight	889.10 g/mole
UV absorption	447 nm
HOMO/LUMO	-5.19 eV/-2.11 eV
Triplet Energy	2.79 eV

LT-N696 TCzTrz 9,9',9''-(5-(4,6-diphenyl-1,3,5-triazin-2-yl)benzene-1,2,3-triyl) tris(9*H*-carbazole)



CAS No.	1808158-40-8
Grade	Sublimed, >99% (HPLC)
Formula	$C_{57}H_{36}N_6$
Molecular Weight	804.94 g/mole
UV absorption	414 nm
HOMO/LUMO	-5.40 eV/-2.18 eV
Triplet Energy	2.80 eV

Reference : ACS Appl. Mater. Interfaces 2015, 7, 9625−9629

Features

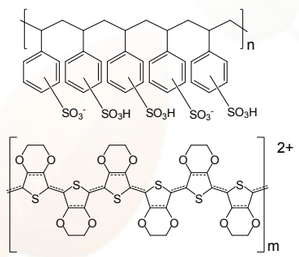
- The TmCzTrz and TCzTrz design approach to realize high EQE in the TADF devices by increasing the number of donor units and dispersing the HOMO evenly over the donor units were effective to obtain high PL quantum yield close to 100% and high EQE above 25% in the green and blue TADF OLEDs.

Device Application

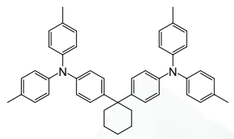
The Green and Blue Device:

ITO/ PEDOT:PSS (60 nm)/ TAPC (20 nm)/ MCP (10 nm)/ DPEPO:TADF emitter (25 nm)/ TSPO1 (5 nm)/ TPBi (20 nm)/ LiF (1 nm)/ Al (200 nm).

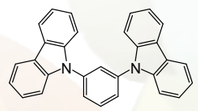
Related products from Lumtec :



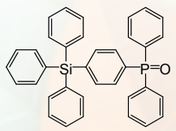
LT-PS001 PEDOT:PSS



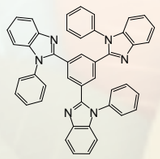
LT-N137 TAPC



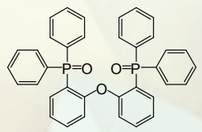
LT-E107 MCP



LT-N4048 TSPO1



LT-E302 TPBi



LT-N4060 DPEPO

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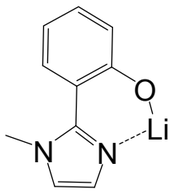
Lumtec Luminescence Technology Corp.

High Triplet Energy n-type Dopants for High Efficiency in Phosphorescent OLEDs

Product Specifications

LT-N896 LiIm Lithium 2-(1-methyl-1*H*-imidazol-2-yl)phenolate



CAS No.	1646267-86-8
Grade	Sublimed, >99 %
Formula	$C_{10}H_9LiN_2O$
Molecular Weight	180.13 g/mole
UV absorption	262, 320, 341 nm
Photoluminescence	387 nm (in CH_2Cl_2)
Triplet Energy	2.82 eV

Reference : C.S. Oh, J.Y. Lee / Organic Electronics 16 (2015) 34–39

Features

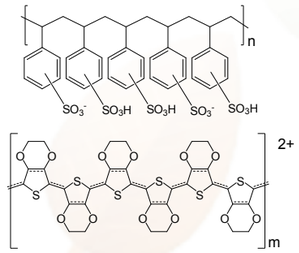
- The LiIm with high triplet energy n-type dopant was effectively synthesized to increase the mobility (two order) of electron transport material and suppress triplet exciton quenching in blue PHOLEDs.
- The quantum efficiency of electron injection layer free PHOLEDs was improved by reduced triplet exciton quenching effect by LiIm compared to Liq.
- The high triplet energy n-type dopant can replace current Liq dopant and simplify the device structure by omitting an electron injection layer.

Device Application

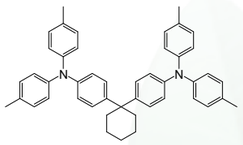
The Blue Device:

ITO (50 nm)/ PEDOT:PSS (60 nm)/ TAPC (20 nm)/ mCBP:FIrpic (25 nm, 10% doping)/ BmPyPb:LiIm (40 nm)/ Al (200 nm).

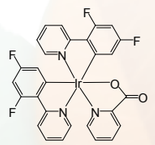
Related products from Lumtec :



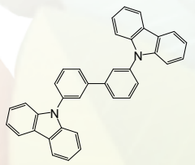
LT-PS001 PEDOT:PSS



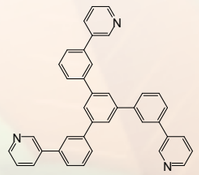
LT-N137 TAPC



LT-E607 FIrPic



LT-N4069 m-CBP



LT-N863 TmPyPB

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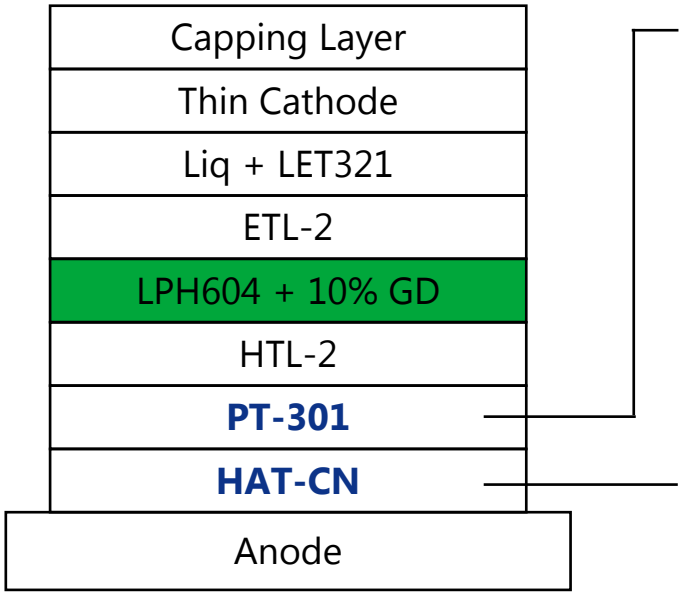
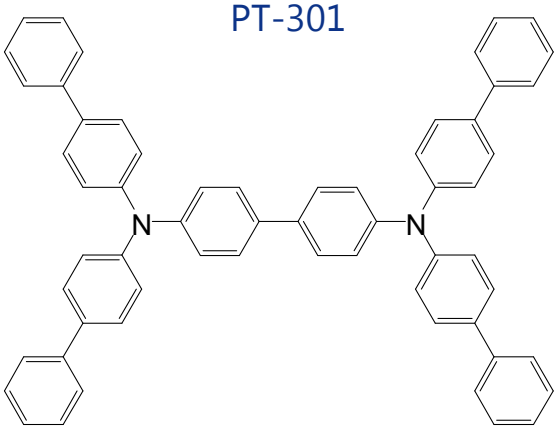
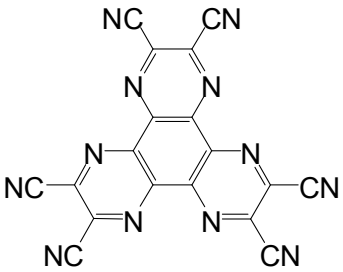
Device Structure



PT-301



HAT-CN (LT-N221)



Device Performance

Item	CIE x	CIE y	Volt@ 1000nits	LE (cd/A)	λ max (nm)	FWHM (nm)	T80 (hr) @ 20mA/cm^2
Green Device	0.36	0.63	3.5	140	556	25	> 50,000 hrs

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