Advanced Materials
Matériaux avancés

# OPV - p-type Materials

Product

## PffBT4T-2DT

PffBT4T-2DT is a medium bandgap p-type material for organic photovoltaic application (OPV). PffBT4T-2DT has a well-balanced combination of desirable properties and stands out as a with ideal features for large-scale printing,

## o-IDTBR

o-IDTBR was first used with P3HT to build remarkably air-stable OPV devices with a PCE over 6.3%. Comparison with fullerene-based devices demonstrated a much-improved stability, with 73% of the device efficiency retained after 1200 hours (stored in the dark).

## EH-IDTBR

EH-IDTBR is a high-performance non-fullerene acceptor for organic solar cells. It was first used with P3HT to build remarkably air-stable OPV devices with a PCE over 6%. It is also known to produce stable devices with a PCE over 11% with the PffBT4T polymer donor family.

## PTQ10

This p-type polymer has demonstrated PCE up to 15.5% without additive and up to 16.5% with DIO with the well-know NFA Y6.[2] Also, this material is great versatility with NFA materials enabling PCE over 12% frequently [1, 3-5] This material is easily processable in xylene

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## IO-4Cl

IO-4Cl is a wide bandgap NFA that can offer PCE over 26% in indoor OPV with the p-type polymer PBDB-T-2F (PM6) with very small energy loss (0.6 eV). This blend also demonstrated PCE over 23% in bladed-coated 4cm2 devices under 1000 lux 2700k LED.

## PBDB-T-2Cl

PBDB-T-2Cl has a similar UV-vis absorption spectrum as well as a similar bandgap than PBDB-T-2F.PBDB-T-2Cl is used in high performance organic solar cells (PCE > 14%) when blended with non-fullerene acceptors such as ITIC-4F.

## IDT-2Br

IDT-2Br is a medium-high bandgap NFA that can produce a high PCE of over 10% with the p-type polymer PTB7-Th. A prominent feature of this blend is the very small energy loss (< 0.6 eV) in the cell, which allows for a very high open-circuit voltage in the device (> 1 V).

## PBDB-T-2F

PM6 is the fluorinated derivative of the PBDB-T. Also, call the PBDB-T-2F, the PM6 exhibited a strong crystallinity and mainly possess a face-on packing, which is beneficial in OPV. Compare to PBDB-T, the HOMO level of PM6 is 0.22 eV lower, (-5.45 eV compare to -5.23 eV for PBDB-T) increasing the Voc in OPV.

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## BTP-4Cl

BTP-4Cl is the chlorinated derivative of the fused benzothiadiazole-based NFA (Y6). This low bandgap and strong absorption NFA material as shown tremendous performances when blended with the p-type polymer PM6.

## EH44

EH44 is a new hole transport layer for high-stability and high-performance perovskite solar cell. EH44 can achieve a PCE > 21% with a 94% of peak efficiency retained after 1000 hours. This product is an alternative to the usual spiro-OMeTAD.

## BTP-4F (Y6)

Y6 uses an electron-deficient molecular core to obtain a low bandgap NFA with an improved electron affinity. OPV devices made from Y6 can reach exceptionally high performances in single-junction devices, with a maximum PCE reported of 15.7% (14.9% certified by ENLI Tech Laboratory).

## BTP (5Y)

Y5 uses an electron-deficient molecular core to obtain a low bandgap NFA and a high absorption coefficient. OPV devices made from Y5 can reach high performances in single-junction devices. Y5 is versatile and can be employed in both conventional and inverted OPV device architectures.

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## PDPPTT

PDPPTT is a p-type conjugated copolymer used in organic field-effect transistors and in high-performance organic photovoltaics, reaching performances over 9%. This material is soluble in chloroform, chlorobenzene, 1,2-dichlorobenzene and 1,2,4-trichlorobenzene. It is slow to solubilize in most solvents.

## PDCBT

PDCBT is used as the hole transport layer in perovskite solar cell (PSC) to enhance its performance (PCE = 21.2%) and its stability (95% of peak efficiency retained after 1000 hours). This high-bandgap polymer can also be used in organic photovoltaic device (OPV) as a p-type material with a non-fullerene acceptor to achieve a PCE > 1

## PBDTS-TDZ

PBDTS-TDZ (PCE13) is a new high-bandgap polymer used in organic solar cells. This material used as a donor achieves a PCE of 13% in conjunction with a non-fullerene acceptor (ITIC). PBDTS-TDZ is a promising new conjugated polymer used in high performance organic solar cells.

## PBDB-T

PBDB-T (PCE12) is used in high performance organic solar cells (OPV) (PCE > 12%), mainly in conjunction with the non-fullerene acceptor ITIC. PBDB-T can also be used as a passivation layer that increases the PCE and the stability of perovskite solar cell (PSC) (PCE > 19%, 90% of peak efficiency retained after 3600 hours).

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## PffBT4T-2OD

PffBT4T-2OD, also known as PCE11, is a p-type material for organic photovoltaic application (OPV). This polymer shows high efficiency (PCE = 10.8%) with a wide variety of fullerene-based electron acceptors.

## PTB7-Th

PTB7-Th (PCE10) is a p-type material used in organic solar cell to achieve PCE approaching 10%.

## PPDT2FBT

PPDT2FBT, also known as PCE9.3, achieves high efficiency in organic photovoltaic devices (PCE = 9.3%) and offers a long-term thermal stability. It is also used as a hole transport layer in perovskite solar cells (PSC) to enhance the performance (PCE = 18.8%) and the stability of the device compared to the usual spiro-OMeTAD.

## ITIC-Cl

ITIC-Cl is an ITIC derivative and possesses lower energy level and a broader absorption spectrum caused by the large dipole moment in C-Cl bond. ITIC-Cl is used as a n-type molecule (non-fullerene acceptor) in organic photovoltaic devices (OPV) and achieves a PCE over 13%.

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## ITIC-F

ITIC-F is a derivative of ITIC possessing lower energy levels and a broader absorption spectrum. It is used as a n-type molecule for organic photovoltaics, allowing very high performances of over 13%.

## ITIC-M

ITIC-M is a derivative of the n-type organic molecule ITIC and possesses the broad and strong absorption spectrum characteristic of these molecules. This non-fullerene acceptor has been used in high performance organic solar cells reaching over 12% in power conversion efficiency. [1-3]

## ITIC

ITIC is a low bandgap molecule possessing an intramolecular donor-acceptor character. In organic photovoltaic device (OPV), this molecule serves as a non-fullerene acceptor with a wide absorption spectrum.