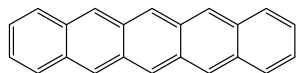


# OPV Materials: Small Molecular Materials

LT-S901

Pentacene

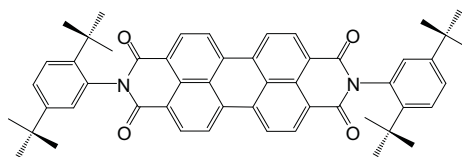


### Pentacene

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>22</sub> H <sub>14</sub>              |
| Molecular Weight             | : 278.35 g/mole                                |
| CAS No.                      | : 135-48-8                                     |
| Thermal Gravimetric Analysis | : >240°C (0.5% weight loss)                    |
| Absorption                   | : 300 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Photoluminescence            | : 509 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Grade                        | : Sublimed product                             |

LT-S902

PDCDT



### *N,N'*-bis(2,5-di-*tert*-butylphenyl)-3,4,9,10-perylene dicarboximide

|                   |   |
|-------------------|---|
| Formula           | : C <sub>52</sub> H <sub>50</sub> N <sub>2</sub> O <sub>4</sub> |
| Molecular Weight  | : 766.96 g/mole   |
| CAS No.           | : 83054-80-2  |
| Absorption        | : 524 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                  |
| Photoluminescence | : 544, 574 nm (in CH <sub>2</sub> Cl <sub>2</sub> )             |
| Grade             | : Sublimed product  |

LT-S903

C<sub>60</sub>

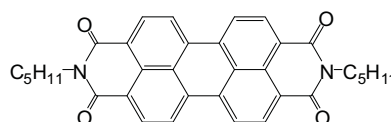


### Fullerene-C<sub>60</sub>

|                              |                             |
|------------------------------|-----------------------------|
| Formula                      | : C <sub>60</sub>           |
| Molecular Weight             | : 720.64 g/mole             |
| CAS No.                      | : 99685-96-8                |
| Thermal Gravimetric Analysis | : >450°C (0.5% weight loss) |
| Grade                        | : Sublimed, > 99%           |

LT-S904

PenPTC

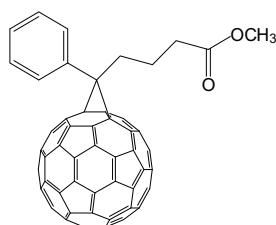


### *N,N'*-dipentyl-3,4,9,10-perylene dicarboximide

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>34</sub> H <sub>30</sub> N <sub>2</sub> O <sub>4</sub> |
| Molecular Weight             | : 530.61 g/mole   |
| CAS No.                      | : 76372-75-3  |
| Thermal Gravimetric Analysis | : >350°C (0.5% weight loss)                                     |
| Absorption                   | : 523 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                  |
| Photoluminescence            | : 535, 573 nm (in CH <sub>2</sub> Cl <sub>2</sub> )             |
| Grade                        | : Sublimed product  |

LT-S905

160848-22-6

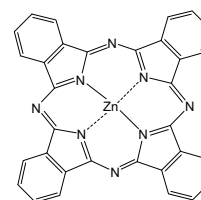


### (6,6)-phenyl-C<sub>61</sub> butyric acid methyl ester

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>72</sub> H <sub>14</sub> O <sub>2</sub> |
| Molecular Weight             | : 910.88 g/mole                                  |
| CAS No.                      | : 160848-21-5                                    |
| Thermal Gravimetric Analysis | : >350°C (0.5% weight loss)                      |
| Absorption                   | : 258, 328 nm (in THF)                           |
| Grade                        | : > 99%  |

LT-S906

ZnPC



### Zinc phthalocyanine

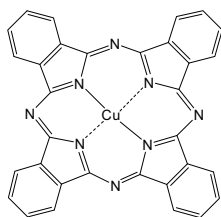
|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>32</sub> H <sub>16</sub> N <sub>4</sub> Zn |
| Molecular Weight             | : 577.91 g/mole                                     |
| CAS No.                      | : 14320-04-8  |
| Thermal Gravimetric Analysis | : >410°C (0.5% weight loss)                         |
| Photoluminescence            | : 534 nm (in CH <sub>2</sub> Cl <sub>2</sub> )      |
| Grade                        | : Sublimed product                                  |

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# OPV Materials: Small Molecular Materials

LT-E201

CuPC

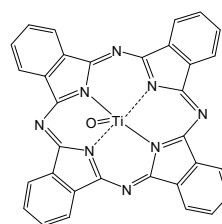


## Phthalocyanine, copper complex

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>32</sub> H <sub>16</sub> CuN <sub>8</sub> |
| Molecular Weight             | : 576.07 g/mole                                    |
| CAS No.                      | : 147-14-8   |
| Thermal Gravimetric Analysis | : >430°C (0.5% weight loss)                        |
| Absorption                   | : 681 nm (in CH <sub>2</sub> Cl <sub>2</sub> )     |
| Photoluminescence            | : 404 nm (film)                                    |
| Grade                        | : Sublimed product                                 |

LT-E206

TiOPC

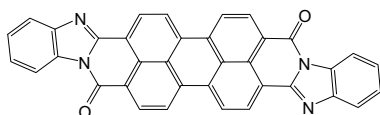


## Titanium oxide phthalocyanine

|                   |  |
|-------------------|--|
| Formula           | : C <sub>32</sub> H <sub>16</sub> N <sub>8</sub> O <sub>2</sub> Ti |
| Molecular Weight  | : 576.39 g/mole  |
| CAS No.           | : 26201-32-1   |
| Photoluminescence | : 392 nm (film)  |
| Grade             | : Sublimed product   |

LT-S918

PTCBI

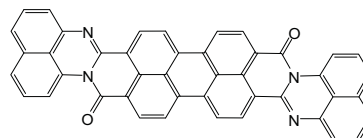


## Bisbenzimidazo[2,1-a:1'-2-b']anthra[2,1,9-def:6,5,10-d'e'f']diisoguinoline-10,21-dione, with *cis* isomer

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>36</sub> H <sub>16</sub> N <sub>4</sub> O <sub>2</sub> |
| Molecular Weight             | : 536.54 g/mole   |
| CAS No.                      | : 55034-79-2  |
| Thermal Gravimetric Analysis | : >420°C (0.5% weight loss)                                     |
| Photoluminescence            | : 397, 414 nm (in CH <sub>2</sub> Cl <sub>2</sub> )             |
| Grade                        | : Sublimed product  |

LT-S919

ADIDI

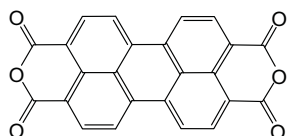


## Anthra[2',1',9''; 4,5,6,6',5'',10''; 4',5',6']diisoquino[2,1-a; 2',1'-a']diperimidine-12,25-dione, with *cis* isomer

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>44</sub> H <sub>20</sub> N <sub>4</sub> O <sub>2</sub> |
| Molecular Weight             | : 636.66 g/mole   |
| CAS No.                      | : 6859-32-1   |
| Thermal Gravimetric Analysis | : >430°C (0.5% weight loss)                                     |
| Photoluminescence            | : 413 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                  |
| Grade                        | : Sublimed product  |

LT-S920

PTCDA

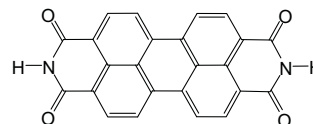


## 3,4,9,10-perylenetetracarboxylic dianhydride

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>24</sub> H <sub>6</sub> O <sub>6</sub> |
| Molecular Weight             | : 392.32 g/mole                                 |
| CAS No.                      | : 128-69-8                                      |
| Thermal Gravimetric Analysis | : >450°C (0.5% weight loss)                     |
| Photoluminescence            | : 413nm (in CH <sub>2</sub> Cl <sub>2</sub> )   |
| Grade                        | : Sublimed product                              |

LT-S921

PTCDI

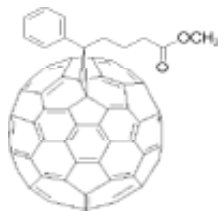


## 3,4,9,10-perylenetetracarboxylic acid diimide

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>24</sub> H <sub>10</sub> N <sub>2</sub> O <sub>4</sub> |
| Molecular Weight             | : 390.35 g/mole   |
| CAS No.                      | : 81-33-4   |
| Thermal Gravimetric Analysis | : >480°C (0.5% weight loss)                                     |
| Photoluminescence            | : 394, 413 nm (in CH <sub>2</sub> Cl <sub>2</sub> )             |
| Grade                        | : Sublimed product  |

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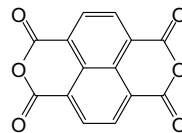
LT-S923

 PC<sub>71</sub>BM

**(6,6)-phenyl C<sub>71</sub> butyric acid methyl ester, mixture of isomers**

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>82</sub> H <sub>14</sub> O <sub>2</sub> |
| Molecular Weight             | : 1030.93 g/mole                                 |
| CAS No.                      | : 609771-63-3                                    |
| Thermal Gravimetric Analysis | : >360°C (0.5% weight loss)                      |
| Absorption                   | : 372 nm (in Toluene)                            |
| Grade                        | : > 99%  |

LT-S924

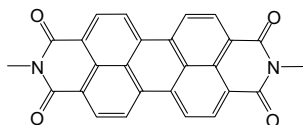
NTDA


**1,4,5,8-naphthalenetetracarboxylic dianhydride**

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>14</sub> H <sub>4</sub> O <sub>6</sub>     |
| Molecular Weight             | : 268.18 g/mole                                     |
| CAS No.                      | : 81-30-1   |
| Thermal Gravimetric Analysis | : >270°C (0.5% weight loss)                         |
| Absorption                   | : 347, 366 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Photoluminescence            | : 394 nm (in CH <sub>2</sub> Cl <sub>2</sub> )      |
| Grade                        | : Sublimed product                                  |

LT-S925

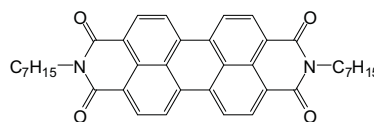
MePTC


**N,N'-dimethyl-3,4,9,10-perylene dicarboximide**

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>26</sub> H <sub>14</sub> N <sub>2</sub> O <sub>4</sub> |
| Molecular Weight             | : 419.40 g/mole   |
| CAS No.                      | : 5521-31-3   |
| Thermal Gravimetric Analysis | : >470°C (0.5% weight loss)                                     |
| Absorption                   | : 522 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                  |
| Photoluminescence            | : 532, 571 nm (in CH <sub>2</sub> Cl <sub>2</sub> )             |
| Grade                        | : Sublimed product  |

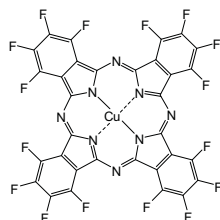
LT-S926

HepPTC


**N,N'-diheptyl-3,4,9,10-perylene dicarboximide**

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>38</sub> H <sub>38</sub> N <sub>2</sub> O <sub>4</sub> |
| Molecular Weight             | : 586.72 g/mole   |
| CAS No.                      | : 95689-91-1  |
| Thermal Gravimetric Analysis | : >390°C (0.5% weight loss)                                     |
| Absorption                   | : 524 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                  |
| Photoluminescence            | : 537, 571 nm (in CH <sub>2</sub> Cl <sub>2</sub> )             |
| Grade                        | : Sublimed product  |
| Reference                    | : <i>Chemical Physics Letters</i> , 383, 2004, 11-15.           |

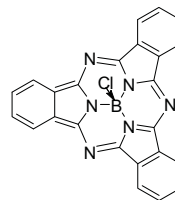
LT-S928

 F<sub>16</sub>CuPC

**Copper(II) 1,2,3,4,8,9,10,11,15,16,17,18,22,23,24,25-hexadecafluoro-29H,31H-phthalocyanine**

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>32</sub> F <sub>16</sub> CuN <sub>8</sub> |
| Molecular Weight             | : 863.92 g/mole                                    |
| CAS No.                      | : 14916-87-1                                       |
| Thermal Gravimetric Analysis | : >400°C (0.5% weight loss)                        |
| Absorption                   | : 690 nm (in THF)                                  |
| Grade                        | : Sublimed product                                 |

LT-S943

SubPC


**Boron subphthalocyanine chloride**

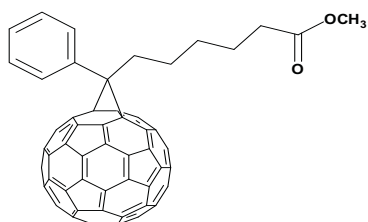
|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>24</sub> H <sub>12</sub> BN <sub>3</sub> Cl |
| Molecular Weight             | : 430.66 g/mole                                      |
| CAS No.                      | : 36530-06-0   |
| Thermal Gravimetric Analysis | : >330°C (0.5% weight loss)                          |
| Absorption                   | : 565 nm (in DMF)                                    |
| Photoluminescence            | : 577 nm (in DMF)                                    |
| Grade                        | : Sublimed product                                   |
| Reference                    | : <i>J. Am. Chem. Soc.</i> 2006, 128, 8108-8109      |

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# OPV Materials: Small Molecular Materials

LT-S946

PC<sub>61</sub>HM

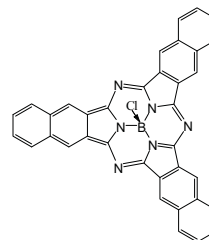


## (6,6)-phenyl-C<sub>61</sub> methyl-hexanoate

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>74</sub> H <sub>18</sub> O <sub>2</sub> |
| Molecular Weight             | : 938.81 g/mole                                  |
| CAS No.                      | : 1242279-48-6                                   |
| Thermal Gravimetric Analysis | : >350°C (0.5% weight loss)                      |
| Absorption                   | : 328 nm (in CH <sub>2</sub> Cl <sub>2</sub> )   |
| Grade                        | : > 99%  |

LT-S947

SubNC

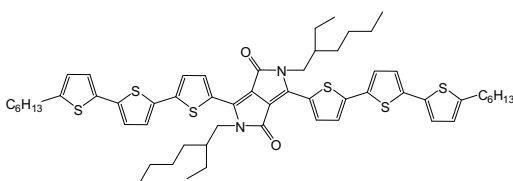


## Boron sub-2,3-naphthalocyanine chloride

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>36</sub> H <sub>18</sub> BClN <sub>6</sub> |
| Molecular Weight             | : 580.83 g/mole                                     |
| CAS No.                      | : 142710-56-3                                       |
| Thermal Gravimetric Analysis | : >370°C (0.5% weight loss)                         |
| Absorption                   | : 658 nm (in CH <sub>2</sub> Cl <sub>2</sub> )      |
| Grade                        | : Sublimed product                                  |

LT-S952

SMDPPEH

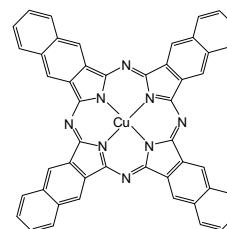


## 2,5-di-(2-ethylhexyl)-3,6-bis-(5''-n-hexyl-[2,2',5',2'']terthiophen-5-yl)-pyrrolo[3,4-c]pyrrole-1,4-dione

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>268</sub> H <sub>72</sub> N <sub>2</sub> O <sub>2</sub> S <sub>6</sub> |
| Molecular Weight             | : 1021.59 g/mole  |
| CAS No.                      | : 1093468-95-1  |
| Thermal Gravimetric Analysis | : >280°C (0.5% weight loss)   |
| Absorption                   | : 644 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                                  |
| Grade                        | : Sublimed, > 98%   |

LT-S962

CuNC

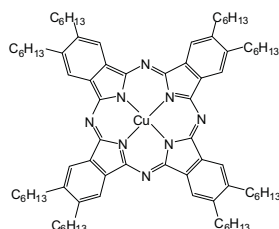


## Copper(II) 2,3-naphthalocyanine

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>48</sub> H <sub>24</sub> CuN <sub>8</sub> |
| Molecular Weight             | : 776.3 g/mole                                     |
| CAS No.                      | : 33273-09-5                                       |
| Thermal Gravimetric Analysis | : >430°C (0.5% weight loss)                        |
| Absorption                   | : 681 nm (in CH <sub>2</sub> Cl <sub>2</sub> )     |
| Grade                        | : Sublimed product                                 |

LT-S963

CuPC-8H

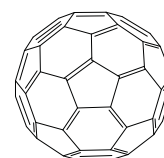


## Copper(II)-2,3,9,10,16,17,23,24-octa-n-hexyl-29H,31H-phthalocyanine

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>280</sub> H <sub>112</sub> CuN <sub>8</sub> |
| Molecular Weight             | : 1249.34 g/mole                                     |
| CAS No.                      | : 153151-22-5  |
| Thermal Gravimetric Analysis | : >390°C (0.5% weight loss)                          |
| Absorption                   | : 680nm (in CH <sub>2</sub> Cl <sub>2</sub> )        |

LT-S967

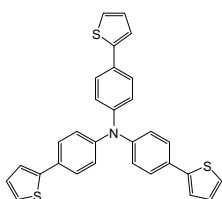
C<sub>70</sub>



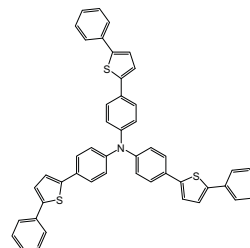
## (5,6)-fullerene-C<sub>70</sub>

|                  |   |
|------------------|---|
| Formula          | : C <sub>70</sub>                                   |
| Molecular Weight | : 840.75 g/mole                                     |
| CAS No.          | : 115383-22-7                                       |
| Absorption       | : 344, 382 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Grade            | : Sublimed, > 99%                                   |

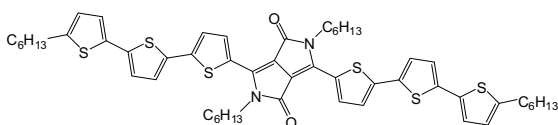
Materials are used by qualified for testing and research only, there are not guaranteed in patent contention by customer use.

**LT-S983**
**TTPA**

**Tris(4-(thiophen-2-yl)phenyl)amine**

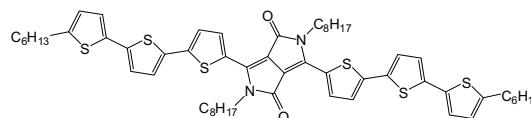
|   |   |   |
|---|---|---|
| Formula   | : | C <sub>30</sub> H <sub>21</sub> NS <sub>3</sub> |
| Molecular Weight                                | : | 491.69 g/mole                                   |
| CAS No.   | : | 142807-63-4                                     |
| Thermal Gravimetric Analysis                    | : | >260°C (0.5% weight loss)                       |
| Absorption                                      | : | 396 nm (in CH <sub>2</sub> Cl <sub>2</sub> )    |
| Grade   | : | Sublimed, > 99%                                 |
| Reference : Appl. Phys. Lett., 94, 063304(2009) |   |   |

**LT-S984**
**TPTPA**

**Tris(4-(5-phenylthiophen-2-yl)phenyl)amine**

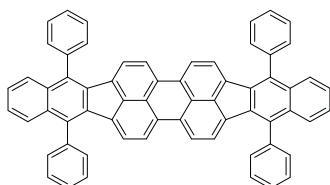
|   |   |   |
|---|---|---|
| Formula   | : | C <sub>48</sub> H <sub>33</sub> NS <sub>3</sub> |
| Molecular Weight                                | : | 719.98 g/mole                                   |
| CAS No.   | : | 1092356-36-9                                    |
| Thermal Gravimetric Analysis                    | : | >270°C (0.5% weight loss)                       |
| Absorption                                      | : | 416 nm (in CH <sub>2</sub> Cl <sub>2</sub> )    |
| Grade   | : | Sublimed, > 99%                                 |
| Reference : Appl. Phys. Lett., 94, 063304(2009) |   |   |

**LT-S985**
**SMDPPH**

**2,5-dihexyl-3,6-bis-(5''-n-hexyl-[2,2',5',2'']terthiophen-5-yl)-pyrrolo[3,4-c]pyrrole-1,4-dione**

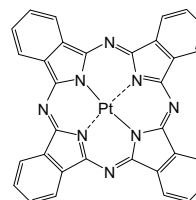
|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | C <sub>50</sub> H <sub>64</sub> N <sub>2</sub> O <sub>2</sub> S <sub>6</sub> |
| Molecular Weight             | : | 965.49 g/mole  |
| CAS No.                      | : | 1077629-69-6   |
| Thermal Gravimetric Analysis | : | >310°C (0.5% weight loss)  |
| Absorption                   | : | 644 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                                 |
| Grade                        | : | > 98%  |

**LT-S986**
**SMDPPO**

**2,5-dioctyl-3,6-bis-(5''-n-hexyl-[2,2',5',2'']terthiophen-5-yl)-pyrrolo[3,4-c]pyrrole-1,4-dione**

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | C <sub>58</sub> H <sub>72</sub> N <sub>2</sub> O <sub>2</sub> S <sub>6</sub> |
| Molecular Weight             | : | 1021.59 g/mole   |
| CAS No.                      | : | 1093468-95-1   |
| Thermal Gravimetric Analysis | : | >280°C (0.5% weight loss)  |
| Absorption                   | : | 644 nm (in CH <sub>2</sub> Cl <sub>2</sub> )                                 |
| Grade                        | : | > 98%  |

**LT-N4003**
**DBP**

**Dibenzo{[f,f']-4,4',7,7'-tetraphenyl}diindeno[1,2,3-cd:1',2',3'-lm]perylene**

|                              |   |                                 |
|------------------------------|---|---------------------------------|
| Formula                      | : | C <sub>64</sub> H <sub>36</sub> |
| Molecular Weight             | : | 804.97 g/mole                   |
| CAS No.                      | : | 187086-37-9                     |
| Thermal Gravimetric Analysis | : | >350°C (0.5% weight loss)       |
| Absorption                   | : | 333 nm (in THF)                 |
| Photoluminescence            | : | 610 nm (in THF)                 |
| Grade                        | : | Sublimed, > 99%                 |

**LT-N219**
**PtPC**

**Phthalocyanine, platinum complex**

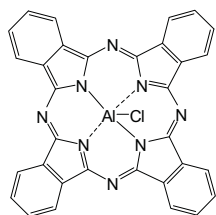
|                              |   |   |
|------------------------------|---|---|
| Formula                      | : | C <sub>32</sub> H <sub>16</sub> N <sub>8</sub> Pt |
| Molecular Weight             | : | 707.6 g/mole                                      |
| CAS No.                      | : | 14075-08-2  |
| Thermal Gravimetric Analysis | : | >460°C (0.5% weight loss)                         |
| Absorption                   | : | 341, 684 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Grade                        | : | Sublimed product                                  |

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

# OPV Materials: Small Molecular Materials

LT-S9025

AIPCCI

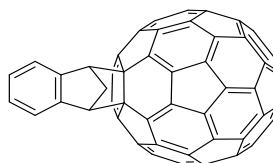


## Aluminum phthalocyanine chloride

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>38</sub> H <sub>16</sub> AlClN <sub>8</sub> |
| Molecular Weight             | : 574.96 g/mole                                      |
| CAS No.                      | : 14154-42-8   |
| Absorption                   | : 675 nm (in DMF)                                    |
| Thermal Gravimetric Analysis | : >470°C (0.5% weight loss)                          |
| Grade                        | : Sublimed product                                   |

LT-S9029

ICMA



## C<sub>60</sub> derivative, indene-C<sub>60</sub> monoadduct

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>68</sub> H <sub>8</sub>                       |
| Molecular Weight             | : 824.79 g/mole  |
| CAS No.                      | : 172885-96-0  |
| Thermal Gravimetric Analysis | : >200°C (0.5% weight loss)                            |
| Absorption                   | : 318 nm (in CH <sub>2</sub> Cl <sub>2</sub> )         |
| Grade                        | : > 99%  |
| Reference                    | : <i>J. Am. Chem. Soc.</i> , 2010, 132(4), pp1377-1382 |

LT-S9030

ICBA

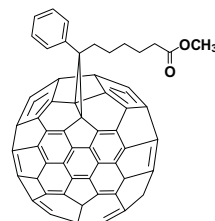


## C<sub>60</sub> derivative, indene-C<sub>60</sub> bisadduct

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>78</sub> H <sub>16</sub>                      |
| Molecular Weight             | : 953.4g/mole  |
| CAS No.                      | : 1207461-57-1   |
| Thermal Gravimetric Analysis | : >200°C (0.5% weight loss)                            |
| Absorption                   | : 318 nm (in CH <sub>2</sub> Cl <sub>2</sub> )         |
| Grade                        | : > 99%with isomers                                    |
| Reference                    | : <i>J. Am. Chem. Soc.</i> , 2010, 132(4), pp1377-1382 |

LT-S9033

PC<sub>71</sub>HM

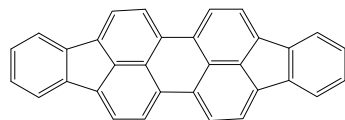


## (6,6)-Phenyl-C<sub>71</sub> hexnoic acid methyl ester, mixture of isomers

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>84</sub> H <sub>18</sub> O <sub>2</sub> |
| Molecular Weight             | : 1059.04 g/mole                                 |
| Thermal Gravimetric Analysis | : >360°C (0.5% weight loss)                      |
| Absorption                   | : 372nm (in Toluene)                             |
| Grade                        | : > 99%  |

LT-S9036

DIP

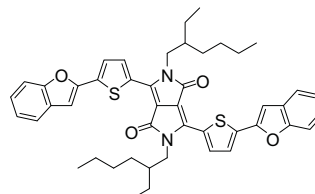


## Diindeno[1,2,3-cd;1',2',3'-lm]perylene

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>32</sub> H <sub>16</sub>               |
| Molecular Weight             | : 400.47 g/mole                                 |
| CAS No.                      | : 188-94-3                                      |
| Thermal Gravimetric Analysis | : >230°C (0.5% weight loss)                     |
| Absorption                   | : 360, 550 nm (film)                            |
| Grade                        | : Sublimed product                              |
| Reference                    | : <i>Adv. Funct. Mater.</i> 2010, 20, 4295-4303 |

LT-S9040

DPP(TBFu)<sub>2</sub>



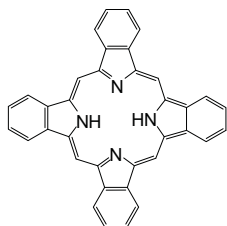
## 3,6-bis(5-(benzofuran-2-yl)thiophen-2-yl)-2,5-bis(2-ethylhexyl)pyrrole-1,4(2H,5H)-dione

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>46</sub> H <sub>48</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub> |
| Molecular Weight             | : 757.01 g/mole  |
| Thermal Gravimetric Analysis | : >330°C (0.5% weight loss)  |
| Grade                        | : > 99%  |
| Reference                    | : <i>Adv. Funct. Mater.</i> 2009, 19, 3063-3069                                |

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

## LT-S9044 BP

**New**

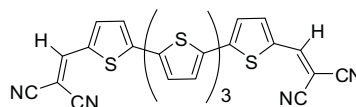


### Tetrabenzoporphine

|                  |  |
|------------------|--|
| Formula          | : C <sub>36</sub> H <sub>22</sub> N <sub>4</sub> |
| Molecular Weight | : 510.59 g/mole                                  |
| CAS No.          | : 52952-31-5                                     |

## LT-S9045 DCV5T

**New**

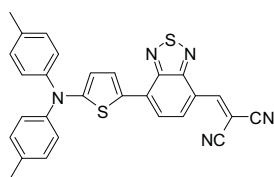


### $\alpha, \alpha'$ -bis(2,2-dicyanovinyl)-quinquethiophene

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>33</sub> H <sub>22</sub> N <sub>4</sub> |
| Molecular Weight             | : 474.55 g/mole                                  |
| Thermal Gravimetric Analysis | : >350°C (0.5% weight loss)                      |
| Grade                        | : Sublimed product                               |

## LT-S9046 DTDCTB

**New**

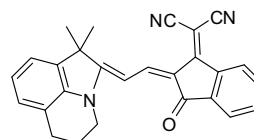


### 2-((7-(5-(dip-tolylamino)thiophen-2-yl)benzo[c][1,2,5]thiadiazol-4-yl)methylene)malononitrile

|                  |   |
|------------------|---|
| Formula          | : C <sub>28</sub> H <sub>18</sub> N <sub>5</sub> S <sub>2</sub> |
| Molecular Weight | : 489.61 g/mole   |

## LT-S9047 HB194

**New**

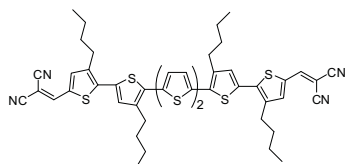


### 2-((Z)-2-((E)-2-(1,1-dimethyl-5,6-dihydro-1H-pyrrolo[3,2,1-ij]quinolin-2(4H)-ylidene)ethylidene)-3-oxo-2,3-dihydro-1H-inden-1-ylidene)malononitrile

|                  |  |
|------------------|--|
| Formula          | : C <sub>27</sub> H <sub>21</sub> N <sub>3</sub> O |
| Molecular Weight | : 403.48 g/mole                                    |

## LT-S9048 DCV6T-Bu(1,2,5,6)

**New**



### 2,2'-(5',5''-(2,2'-bithiophene-5,5'-diyl)bis(3,4'-dibutyl-2,2'-bithiophene-5',5'-diyl))bis(methan-1-yl-1-ylidene)dimalononitrile

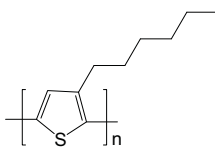
|                  |   |
|------------------|---|
| Formula          | : C <sub>48</sub> H <sub>46</sub> N <sub>4</sub> S <sub>6</sub> |
| Molecular Weight | : 871.3 g/mole  |

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

# OPV Materials: Polymer Materials

LT-S909

P3HT

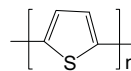


## Poly(3-hexylthiophene-2,5-diyl)

|                              |   |                                |
|------------------------------|---|--------------------------------|
| Formula                      | : | $(C_{10}H_{14}S)_n$            |
| CAS No.                      | : | 104934-50-1                    |
| Type                         | : | Regioregular(Electronic Grade) |
| Glass Transition Temperature | : | 214°C                          |
| Thermal Gravimetric Analysis | : | >350°C (0.5% weight loss)      |
| Absorption                   | : | 445 nm (in THF)                |
| Photoluminescence            | : | 564 nm (in THF)                |

LT-S911

PT

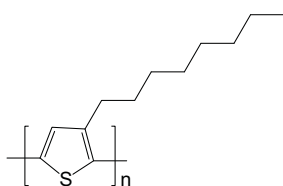


## Poly(thiophene-2,5-diyl)

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | $(C_4H_2S)_n$                                |
| CAS No.                      | : | 25233-34-5                                   |
| Thermal Gravimetric Analysis | : | >200°C (0.5% weight loss)                    |
| Absorption                   | : | 427 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Photoluminescence            | : | 510 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |

LT-S930

P3OT

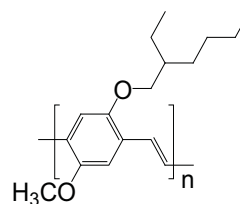


## Poly(3-octylthiophene-2,5-diyl)

|                              |   |                           |
|------------------------------|---|---------------------------|
| Formula                      | : | $(C_{12}H_{18}S)_n$       |
| CAS No.                      | : | 104934-51-2               |
| Thermal Gravimetric Analysis | : | >350°C (0.5% weight loss) |
| Absorption                   | : | 445 nm (in THF)           |
| Photoluminescence            | : | 564 nm (in THF)           |

LT-S931

MEH-PPV

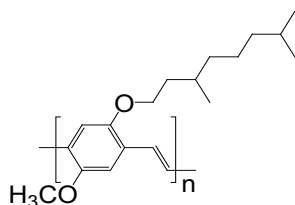


## Poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene]

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | $(C_{18}H_{28}O_2)_n$                        |
| Mw                           | : | 500,000~1,000,000                            |
| CAS No.                      | : | 138184-36-8                                  |
| Thermal Gravimetric Analysis | : | >200°C (0.5% weight loss)                    |
| Absorption                   | : | 501 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Photoluminescence            | : | 557 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |

LT-S932

MDMO-PPV

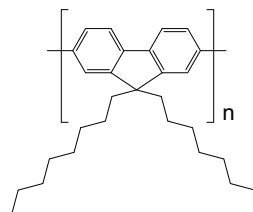


## Poly[2-methoxy-5-(3,7-dimethyloctyloxy)-1,4-phenylenevinylene]

|                              |   |                           |
|------------------------------|---|---------------------------|
| Formula                      | : | $(C_{19}H_{28}O_2)_n$     |
| Mw                           | : | > 100,000                 |
| CAS No.                      | : | 177716-59-5               |
| Thermal Gravimetric Analysis | : | >250°C (0.5% weight loss) |
| Absorption                   | : | 485 nm (in THF)           |
| Photoluminescence            | : | 555 nm (in THF)           |

LT-S933

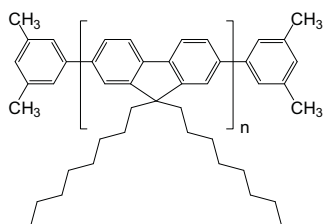
PFO



## Poly(9,9-dioctylfluorenyl-2,7-diyl)

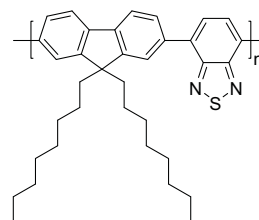
|                              |   |                           |
|------------------------------|---|---------------------------|
| Formula                      | : | $(C_{29}H_{40})_n$        |
| Mw                           | : | 100,000~150,000           |
| CAS No.                      | : | 19456-48-5                |
| Thermal Gravimetric Analysis | : | >300°C (0.5% weight loss) |
| Absorption                   | : | 376 nm (in THF)           |
| Photoluminescence            | : | 426, 440 nm (in THF)      |

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

**LT-S934**
**PFO-DMP**


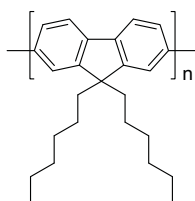
**Poly(9,9-dioctylfluorenyl-2,7-diyl) end capped with dimethylphenyl**

|                              |                                  |
|------------------------------|----------------------------------|
| Formula                      | : $C_{16}H_{18}(C_{29}H_{40})_n$ |
| Mw                           | : 100,000~150,000                |
| Thermal Gravimetric Analysis | : >350°C (0.5% weight loss)      |
| Absorption                   | : 368 nm (in THF)                |
| Photoluminescence            | : 421 nm (in THF)                |

**LT-S957**
**F8BT**


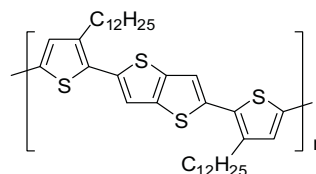
**Poly[(9,9-dioctylfluorenyl-2,7-diyl)-alt-(benzo[2,1,3]thiadiazol-4,7-diyl)]**

|                              |                             |
|------------------------------|-----------------------------|
| Formula                      | : $(C_{35}H_{42}N_2S)_n$    |
| Mw                           | : 20,000~50,000             |
| CAS No.                      | : 210347-52-7               |
| Thermal Gravimetric Analysis | : >330°C (0.5% weight loss) |
| Absorption                   | : 453 nm (in THF)           |
| Photoluminescence            | : 645 nm (in THF)           |

**LT-S958**
**PHF**


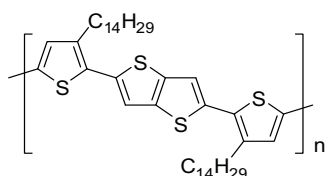
**Poly(9,9-dihexylfluorenyl-2,7-diyl)**

|                              |                             |
|------------------------------|-----------------------------|
| Formula                      | : $(C_{25}H_{32})_n$        |
| Mw                           | : 80,000~150,000            |
| CAS No.                      | : 201807-75-2               |
| Thermal Gravimetric Analysis | : >370°C (0.5% weight loss) |
| Absorption                   | : 389 nm (in THF)           |
| Photoluminescence            | : 418 nm (in THF)           |

**LT-S981**
**PBTTT-C<sub>12</sub>**


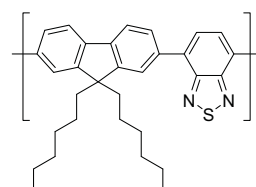
**Poly[2,5-bis(3-dodecylthiophen-2-yl)thieno[3,2-b]thiophene]**

|                              |                             |
|------------------------------|-----------------------------|
| Formula                      | : $(C_{35}H_{54}S_4)_n$     |
| Mw                           | : 40,000~80,000             |
| CAS No.                      | : 888491-18-7               |
| Thermal Gravimetric Analysis | : >290°C (0.5% weight loss) |
| Absorption                   | : 460 nm (in THF)           |
| Photoluminescence            | : 557 nm (in THF)           |

**LT-S982**
**PBTTT-C<sub>14</sub>**


**Poly[2,5-bis(3-tetradecylthiophen-2-yl)thieno[3,2-b]thiophene]**

|                              |   |
|------------------------------|---|
| Formula                      | : $(C_{42}H_{62}S_4)_n$                       |
| Mw                           | : 40,000~80,000                               |
| CAS No.                      | : 888491-19-8                                 |
| Thermal Gravimetric Analysis | : >350°C (0.5% weight loss)                   |
| Absorption                   | : 466 nm (in THF)                             |
| Reference                    | : <i>Appl. Phys. Lett.</i> , 92, 113309, 2008 |

**LT-S9002**
**F6BT**


**Poly[(9,9-dihexylfluorenyl-2,7-diyl)-alt-(benzo[2,1,3]thiadiazol-4,7-diyl)]**

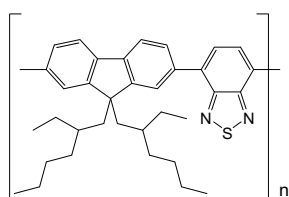
|                              |                             |
|------------------------------|-----------------------------|
| Formula                      | : $(C_{31}H_{34}N_2S)_n$    |
| Mw                           | : 20,000~50,000             |
| CAS No.                      | : 579505-53-6               |
| Thermal Gravimetric Analysis | : >340°C (0.5% weight loss) |
| Absorption                   | : 453 nm (in THF)           |
| Photoluminescence            | : 645 nm (in THF)           |

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

# OPV Materials: Polymer Materials

LT-S9003

F2EHBT

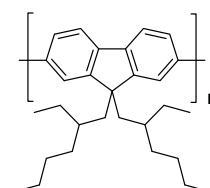


**Poly[(9,9-bis(2-ethylhexyl)fluorenyl-2,7-diyl)-alt-(benzo[2,1,3]thiadiazol-4,7-diyl)]**

|                              |   |                           |
|------------------------------|---|---------------------------|
| Formula                      | : | $(C_{35}H_{42}N_2S)_n$    |
| Mw                           | : | 20,000~50,000             |
| Thermal Gravimetric Analysis | : | >330°C (0.5% weight loss) |
| Absorption                   | : | 453 nm (in THF)           |
| Photoluminescence            | : | 645 nm (in THF)           |

LT-S9004

PF2EH

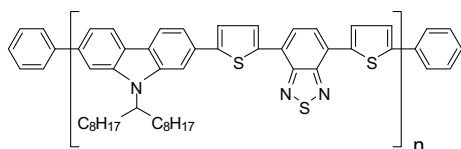


**Poly[9,9-bis(2-ethylhexyl)fluorenyl-2,7-diyl]**

|                              |   |                           |
|------------------------------|---|---------------------------|
| Formula                      | : | $(C_{29}H_{40})_n$        |
| Mw                           | : | > 20,000                  |
| CAS No.                      | : | 188201-16-3               |
| Thermal Gravimetric Analysis | : | >360°C (0.5% weight loss) |
| Absorption                   | : | 389 nm (in THF)           |
| Photoluminescence            | : | 418 nm (in THF)           |

LT-S948

PCDTBT

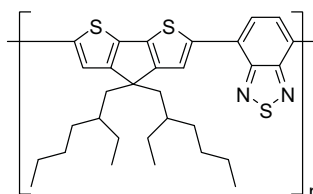


**Poly[N-9'-heptadecanyl-2,7-carbazole-alt-5,5-(4',7'-di-2-thienyl-2',1',3'-benzothiadiazole)]**

|                              |   |   |
|------------------------------|---|---|
| Formula                      | : | $(C_{43}H_{47}N_3S_3)_n$                    |
| Mw                           | : | 20,000~100,000                              |
| Thermal Gravimetric Analysis | : | >400°C (0.5% weight loss)                   |
| Absorption                   | : | 390, 554 nm (in THF)                        |
| Photoluminescence            | : | 639 nm (in THF)                             |
| Reference                    | : | <i>J. Am. Chem. Soc.</i> 2008, 130, 732-742 |

LT-S949

PCPDTBT

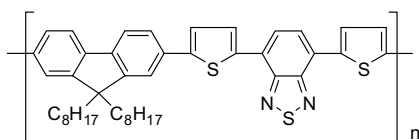


**Poly[2,6-(4,4-bis(2-ethylhexyl)-4H-cyclopenta[2,1-b;3,4-b']dithiophene)-alt-4,7(2,1,3-benzothiadiazole)]**

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | $(C_{31}H_{38}N_2S_3)_n$               |
| Mw                           | : | 7,000~20,000                           |
| CAS No.                      | : | 920515-34-0                            |
| Thermal Gravimetric Analysis | : | >300°C (0.5% weight loss)              |
| Absorption                   | : | 695 nm (in THF)                        |
| Photoluminescence            | : | 564.5 nm (in THF)                      |
| Reference                    | : | <i>Adv. Mater.</i> 2006, 18, 2884-2889 |

LT-S950

PFODBT

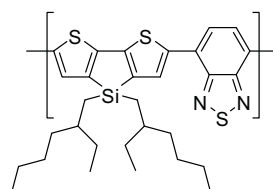


**Poly[2,7-(9,9-di-octyl-fluorene)-alt-4,7-bis(thiophen-2-yl)benzo-2,1,3-thiadiazole]**

|                              |   |   |
|------------------------------|---|---|
| Formula                      | : | $(C_{43}H_{48}N_2S_3)_n$                      |
| Mw                           | : | 10,000~50,000                                 |
| Thermal Gravimetric Analysis | : | >380°C (0.5% weight loss)                     |
| Absorption                   | : | 523 nm (in $CH_2Cl_2$ )                       |
| Photoluminescence            | : | 630 nm (in $CH_2Cl_2$ )                       |
| Reference                    | : | <i>Adv. Funct. Mater.</i> , 2006, 16, 667-674 |

LT-S951

PSBTBT



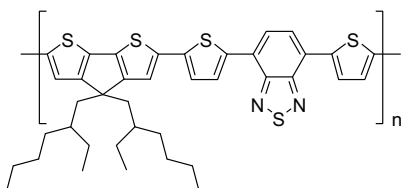
**Poly[2,6-(4,4'-bis(2-ethylhexyl)dithieno[3,2-b:2',3'-d]silole)-alt-4,7(2,1,3-benzothiadiazole)]**

|                              |   |   |
|------------------------------|---|---|
| Formula                      | : | $(C_{30}H_{38}N_2S_3Si)_n$                      |
| CAS No.                      | : | 1089687-02-4                                    |
| Mw                           | : | 10,000~30,000                                   |
| Thermal Gravimetric Analysis | : | >290°C (0.5% weight loss)                       |
| Absorption                   | : | 523 nm (in $CH_2Cl_2$ )                         |
| Photoluminescence            | : | 630 nm (in $CH_2Cl_2$ )                         |
| Reference                    | : | <i>J. Am. Chem. Soc.</i> 2008, 130, 16144-16145 |

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LT-S953

PCPDTTBTT

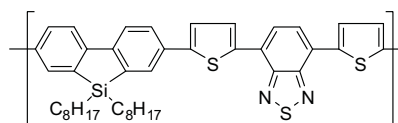


**Poly[2,6-(4,4-bis(2-ethylhexyl)-4H-cyclopenta[2,1-b:3,4-b']dithiophene-alt-4,7-bis(thiophen-2-yl)benzo-2,1,3-thiadiazole]**

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | $(C_{39}H_{42}N_2S_6)_n$                     |
| CAS No.                      | : | 1035681-83-4                                 |
| Mw                           | : | 8,000~20,000                                 |
| Thermal Gravimetric Analysis | : | >270°C (0.5% weight loss)                    |
| Absorption                   | : | 523 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Photoluminescence            | : | 749 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Reference                    | : | <i>Chem. Mater.</i> 2008, 20, 4045-4050      |

LT-S954

PSiF-DTBT

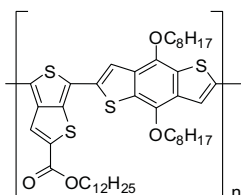


**Poly[2,7-(9,9-dioctyl-dibenzosilole)-alt-4,7-bis(thiophen-2-yl)benzo-2,1,3-thiadiazole]**

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | $(C_{42}H_{46}N_2S_3Si)_n$                   |
| Mw                           | : | 10,000~80,000                                |
| Thermal Gravimetric Analysis | : | >400°C (0.5% weight loss)                    |
| Absorption                   | : | 530 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Reference                    | : | <i>Appl. Phys. Lett.</i> 92, 033307, 2008    |

LT-S955

PTB1

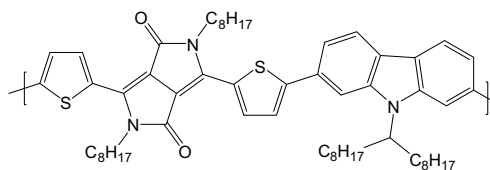


**Poly[4,6-(dodecyl-thieno[3,4-b]thiophene-2-carboxylate)-alt-2,6-(4,8-dioctoxybenzo[1,2-b:4,5-b']dithiophene)]**

|                   |   |   |
|-------------------|---|---|
| Formula           | : | $(C_{48}H_{62}O_4S_4)_n$                          |
| Mw                | : | 20,000~100,000                                    |
| Absorption        | : | >270°C (0.5% weight loss)                         |
| Photoluminescence | : | 655, 703 nm (in CH <sub>2</sub> Cl <sub>2</sub> ) |
| Reference         | : | <i>J. Am. Chem. Soc.</i> 2009, 131, 56-57         |

LT-S9032

PCBTDPP



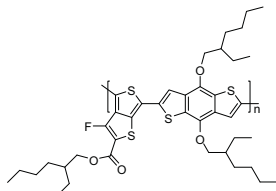
**Poly[N-90-heptadecanyl-2,7-carbazole-alt-3,6-bis(thiophen-5-yl)-2,5-dioctyl-2,5-dihydropyrrolo[3,4]pyrrole-1,4-dione]**

|                              |   |  |
|------------------------------|---|--|
| Formula                      | : | $(C_{61}H_{85}N_3O_2S_2)_n$                    |
| Mw                           | : | 10,000~50,000                                  |
| Thermal Gravimetric Analysis | : | >200°C (0.5% weight loss)                      |
| Absorption                   | : | 647 nm (in THF)                                |
| Reference                    | : | <i>Organic Electronics</i> 11 (2010) 1053-1058 |

LT-S9050

PTB7

New



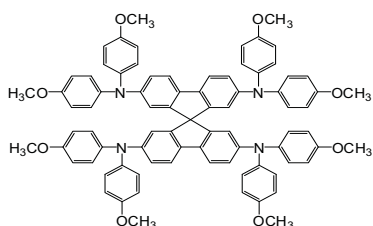
**Poly{4,8-bis[(2-ethylhexyl)oxy]benzo[1,2-b:4,5-b']dithiophene-2,6-diyl-alt-3-fluoro-2-[(2-ethylhexyl)carbonyl]thieno[3,4-b]thiophene-4,6-diyl}**

|         |   |                           |
|---------|---|---------------------------|
| Formula | : | $(C_{41}H_{53}FO_4S_4)_n$ |
| Mw      | : | 10000~60000               |

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# OPV Materials: DSSC Materials

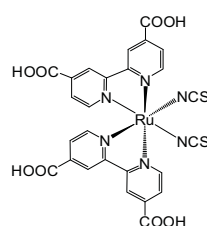
## LT-S922 Spiro-MeOTAD



### 2,2',7,7'-tetrakis(*N,N*-di-*p*-methoxyphenylamino)-9,9'-spirobifluorene

|                              |   |
|------------------------------|---|
| Formula                      | : C <sub>81</sub> H <sub>68</sub> N <sub>4</sub> O <sub>8</sub> |
| Molecular Weight             | : 1225.43 g/mole  |
| CAS No.                      | : 207739-72-8   |
| Thermal Gravimetric Analysis | : >360°C (0.5% weight loss)                                     |
| Absorption                   | : 306, 385nm (in CH <sub>2</sub> Cl <sub>2</sub> )              |
| Photoluminescence            | : 429nm (in CH <sub>2</sub> Cl <sub>2</sub> )                   |
| Grade                        | : > 99%   |
| Reference                    | : MRS. BULLETIN, 30, 2005, p23                                  |

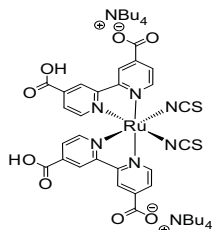
## LT-S944 N3



### *cis*-bis(isothiocyanato)bis(2,2'-bipyridyl-4,4'-dicarboxylato)ruthenium(II)

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>26</sub> H <sub>16</sub> N <sub>6</sub> O <sub>8</sub> RuS <sub>2</sub> |
| Molecular Weight             | : 705.64 g/mole  |
| CAS No.                      | : 141460-19-7  |
| Thermal Gravimetric Analysis | : >230°C (0.5% weight loss)  |
| Grade                        | : > 99%  |
| Reference                    | : <i>Inorg. Chem.</i> , 1999, 38 (26), p6298-6305                                |

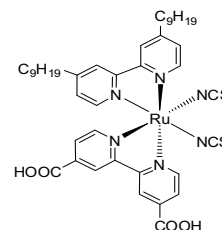
## LT-S945 N719



### *cis*-bis(isothiocyanato)-bis(2,2'-bipyridyl-4,4'-dicarboxylato)ruthenium(II) bis(tetrabutylammonium)

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>42</sub> H <sub>52</sub> N <sub>6</sub> O <sub>4</sub> RuS <sub>2</sub> |
| Molecular Weight             | : 1187.7 g/mol   |
| CAS No.                      | : 207347-46-4  |
| Thermal Gravimetric Analysis | : >230°C (0.5% weight loss)  |
| Grade                        | : > 99%  |
| Reference                    | : <i>Inorg. Chem.</i> , 1999, 38, 6298-6305                                      |

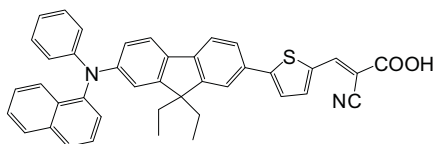
## LT-S964 Z907



### *cis*-bis(isothiocyanato)-(2,2'-bipyridyl-4,4'-dicarboxylic acid)(2,2'-bipyridyl-4,4'-dinonyl)ruthenium(II)

|                              |  |
|------------------------------|--|
| Formula                      | : C <sub>42</sub> H <sub>52</sub> N <sub>6</sub> O <sub>4</sub> RuS <sub>2</sub> |
| Molecular Weight             | : 870.10 g/mol   |
| CAS No.                      | : 502693-09-6  |
| Thermal Gravimetric Analysis | : >230°C (0.5% weight loss)  |
| Grade                        | : > 99%  |
| Reference                    | : <i>Nature Materials</i> , 2, 402 (2003)  |

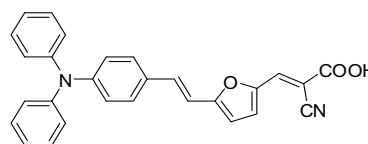
## LT-S9023 DEFL-NPB-TCA



### (*E*)-3-(5-(2-(*N*-(naphthalen-5-yl)-*N*-phenylamino)-9,9-diethyl-9H-fluoren-7-yl)thiophen-2-yl)-2-cyanoacrylic acid

|                   |   |
|-------------------|---|
| Formula           | : C <sub>41</sub> H <sub>32</sub> N <sub>2</sub> O <sub>2</sub> S |
| Molecular Weight  | : 616.1 g/mol   |
| CAS No.           | : 1234799-59-7  |
| Absorption        | : 421 nm (in THF)   |
| Photoluminescence | : 538 nm (in THF)   |
| Grade             | : > 99%   |
| Reference         | : <i>Chem. Commun.</i> , 2005, 4098-4010                          |

## LT-S9024 DPAS-FCA



### (*E*)-2-cyano-3-(5-(4-(diphenylamino)styryl)furan-2-yl)acrylic acid

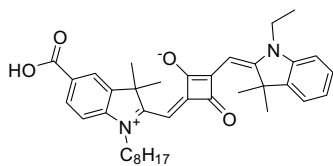
|                   |   |
|-------------------|---|
| Formula           | : C <sub>28</sub> H <sub>20</sub> N <sub>2</sub> O <sub>3</sub> |
| Molecular Weight  | : 432.1 g/mol   |
| Absorption        | : 469 nm (in THF)   |
| Photoluminescence | : 533 nm (in THF)   |
| Grade             | : > 99%   |
| Reference         | : <i>Org. Lett.</i> 2009, 11, 97                                |

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LT-S9037

SQ01

**New**



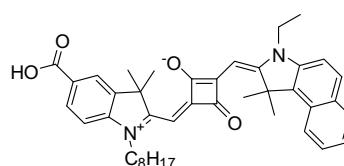
**(E)-4-((5-carboxy-3,3-dimethyl-1-octyl-3H-indolium-2-yl)methylene)-2-((E)-(1-ethyl-3,3-dimethylindolin-2-ylidene)methyl)-3-oxocyclobut-1-enolate**

Formula : C<sub>37</sub>H<sub>44</sub>N<sub>2</sub>O<sub>4</sub>  
Molecular Weight : 580.67 g/mole

LT-S9038

SQ02

**New**



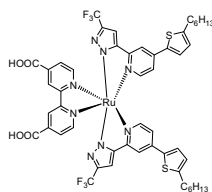
**(E)-4-((5-carboxy-3,3-dimethyl-1-octyl-3H-indolium-2-yl)methylene)-2-((E)-(3-ethyl-1,1-dimethyl-1H-benzo[e]indol-2(3H)-ylidene)methyl)-3-oxocyclobut-1-enolate**

Formula : C<sub>41</sub>H<sub>46</sub>N<sub>2</sub>O<sub>4</sub>  
Molecular Weight : 630.81 g/mole

LT-S9051

TFRS-2

**New**



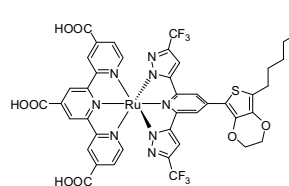
**Bis(4-(5-hexylthiophen-2-yl)-2-(3-(trifluoromethyl)-1H-pyrazol-5-yl)pyridinato)(2,2'-bipyridyl-4,4'-dicarboxylato)-ruthenium(II)**

Formula : C<sub>50</sub>H<sub>46</sub>F<sub>6</sub>N<sub>8</sub>O<sub>4</sub>RuS<sub>2</sub>  
Molecular Weight : 1102.14 g/mole

LT-S9052

TF-3

**New**



Formula : C<sub>43</sub>H<sub>32</sub>F<sub>6</sub>N<sub>8</sub>O<sub>8</sub>RuS  
Molecular Weight : 1035.89 g/mole

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