

太阳能电池研究用试剂

Solar Cell Materials



钙钛矿太阳能电池(PSC)材料

有机光伏电池(OPV)材料

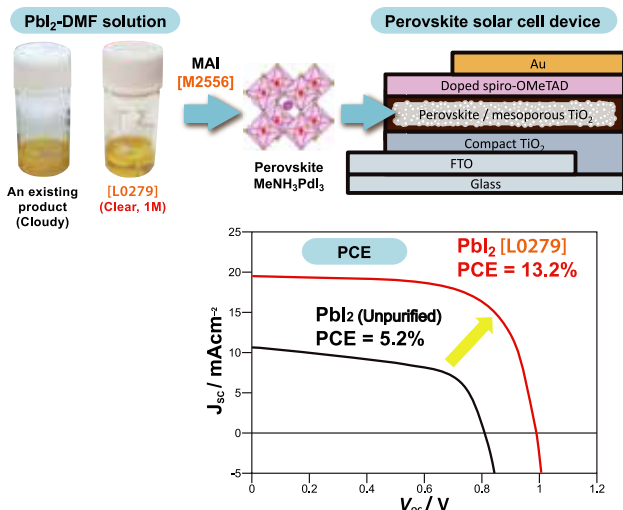
染料敏化太阳能电池(DSSC)材料

太阳能电池研究用试剂

太阳光，作为自然界最重要的可再生能源之一，是解决二十一世纪全球环境与能源问题的有效方案。为了尽可能有效的使用太阳能资源，高效并且价廉的太阳能电池得到了蓬勃发展，并被应用到现实生活中。众所周知，目前实际应用的硅基太阳能电池生产成本高，其它无机材料太阳能电池也存在相同的问题。为了解决成本问题，有机材料以及有机-无机杂化材料太阳能电池被开发出来。

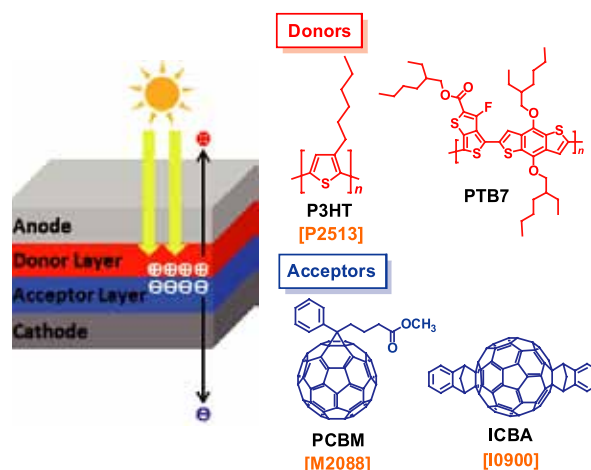
1. 钙钛矿太阳能电池(PSC)材料

由Miyasaka等在2009年首次报道的钙钛矿太阳能电池，近来受到了广泛关注¹⁾。有机-无机钙钛矿， RNH_3PbX_3 ($X=Cl, Br, I; R=Me, NH=CH$, 等)，可以用作光吸收层。自2012年起，钙钛矿太阳能电池的能量转换效率(PCE)得到了大幅提升，可达到15%以上，优于OPV和DSSC²⁻⁵⁾。钙钛矿太阳能电池器件可以通过溶液加工制造，降低了成本。有机-无机钙钛矿 RNH_3PbX_3 制备简单，可以由有机胺和卤化铅的HX盐制得。通过改变 $(MeNH_3)PbX_3$ 中的卤素X，可以对吸收波长的范围进行调节⁶⁾。X=Br时，钙钛矿化合物可以有效吸收短波长的太阳光。X=I时，则对长波长的光更加有效。Wakamiya等报道指出，高度干燥的 PbI_2 (II)是实现高重复性制造高效太阳能电池器件的关键(PCE>10)^{7,8)}。钙钛矿层中载流子的行为与OPV不同，它有一些自由的载流子，电子和空穴可以自由移动⁹⁾。因此，钙钛矿层不用复合就可以传输电子和空穴载流子。



2. 有机光伏电池(OPV)材料

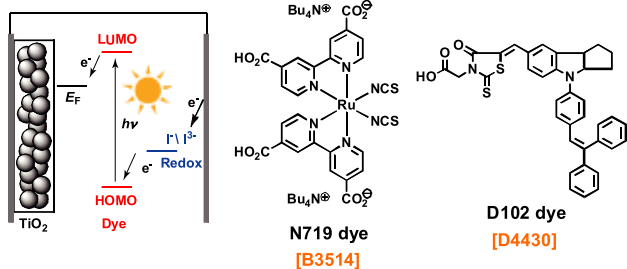
有机光伏电池(OPV)的原型是由Tang等在1986年首次报道¹⁰⁾。制造OPV器件可以使用印刷或卷对卷等较为高效的方法。OPV器件通常需要本体异质结(BHJ)，而将电子供体(p-型半导体)和电子受体(n-型半导体)混合即可对BHJ进行制备¹¹⁾。以往的材料大多涉及 π -共轭聚合物型和小分子半导体，而后来的材料通常是富勒烯衍生物。PCBM是一种是改进了溶解度的富勒烯，可以高效地提供本体异质结¹²⁾。相对于PCBM，ICBM具有能量更高的LUMO，因此可以产生较高的开路电压¹³⁾。C₇₀衍生物与对应的C₆₀衍生物相比，吸光性更好，因此电池效率也更高¹⁴⁾。在p型半导体聚合物中引入受体组分，可形成供体-受体聚合物(DA-型)，其基于电荷转移可以在长波区域进行光吸收¹⁵⁾。



3. 染料敏化太阳能电池(DSSC)材料

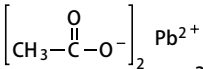
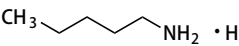
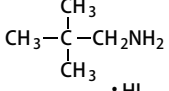
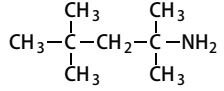
Grätzel等于1991年首次开发出了染料敏化太阳能电池(DSSC)¹⁶⁾。染料敏化太阳能电池(DSSC)是一种液体型器件，其包含了用作半导体电极的纳米多孔二氧化钛(TiO_2)，有机染料敏化剂，以及含有氧化还原成分的电解质溶液。与其他太阳能电池相比，其结构简单，因其器件结构简单，有望成为一种低成本的太阳能电池¹⁷⁾。DSSC在光线弱的情况下也能使用，因此有可能安装在室内。金属钉与联吡啶配体的络合物是太阳能电池中普遍使用的一种有机染料¹⁸⁾。在钉络合物的多吡啶配体中引入一些羧基和磷酸基团，即可和二氧化钛进行连接。除此之

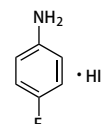
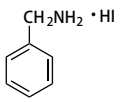
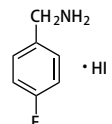
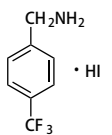
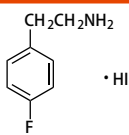
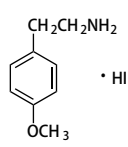
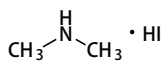
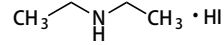
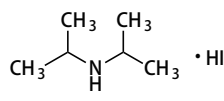
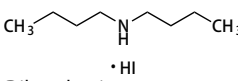

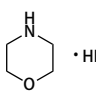
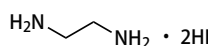
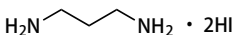
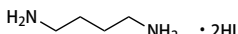
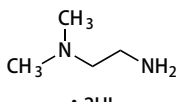
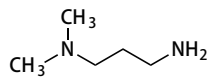
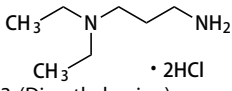
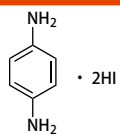
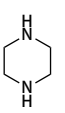
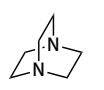
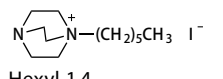


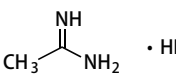
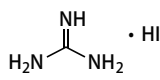
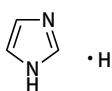

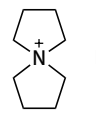
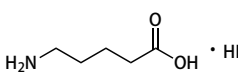
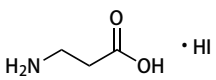
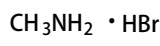
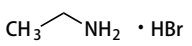
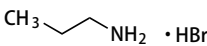
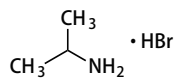
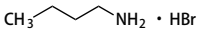
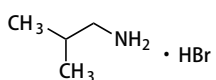
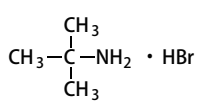
外，由于钌原子价格昂贵，无金属有机染料(如：D-102, D-131 和 D-358) 也被开发出来^{19,20)}。最近，还开发出了一种用于DSSC的高效锌-卟啉绿色染料，其能量转换效率(PCE)高于10%^{21,22)}。此外，一种高效的具有吡咯并吡咯二酮结构的无金属有机蓝色染料也被开发出来用于DSSC (PCE> 10%)²³⁾。

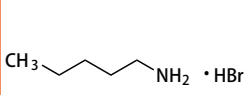
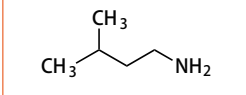
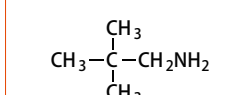
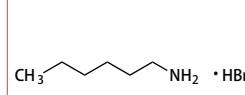
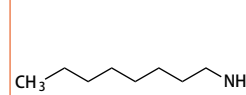
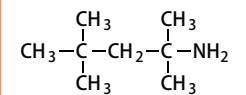
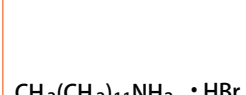
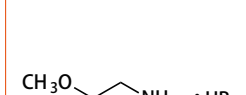
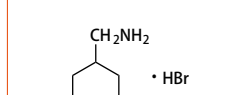
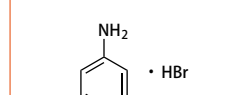
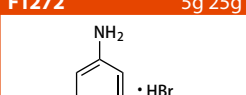
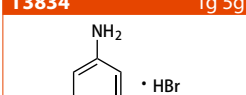
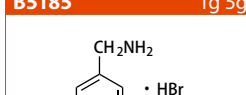
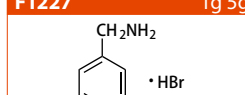
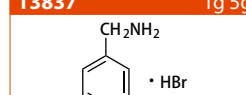

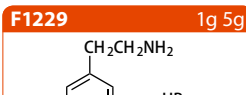
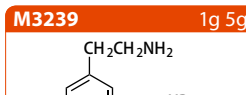






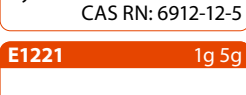
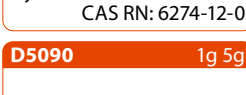
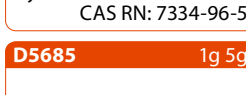
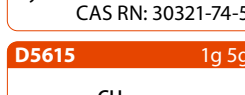

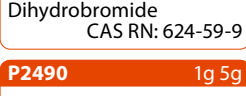
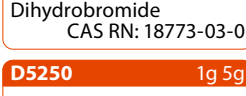
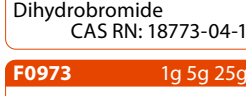
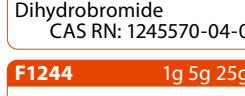
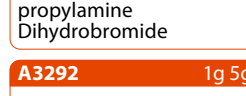
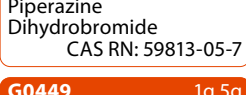
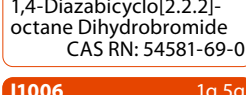
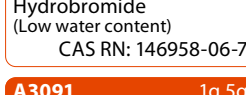
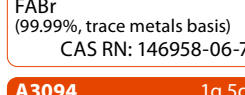


参考文献

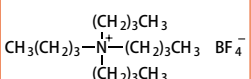
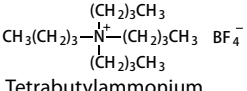
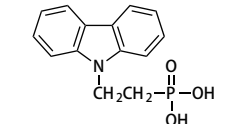
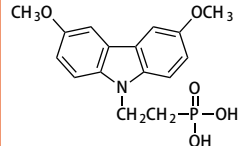
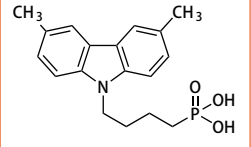
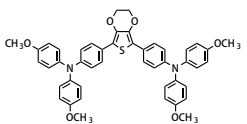
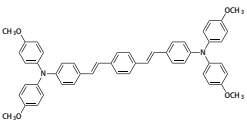
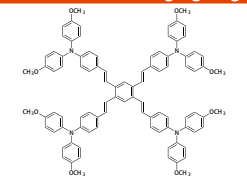

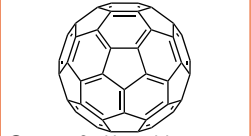
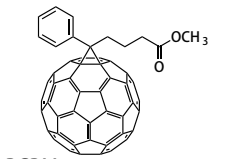
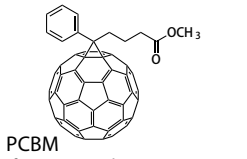
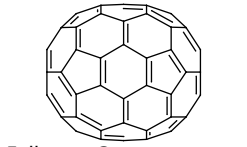
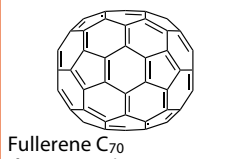
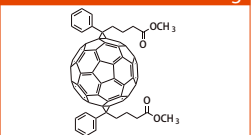
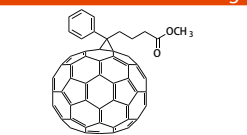
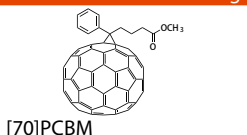
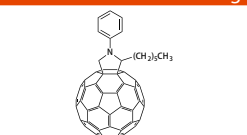
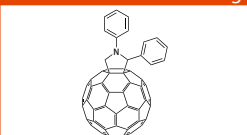
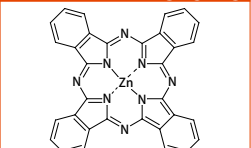
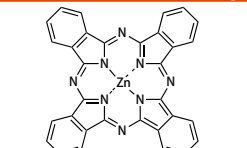
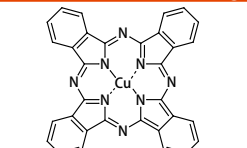
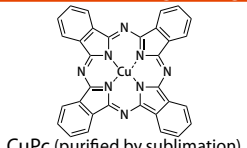
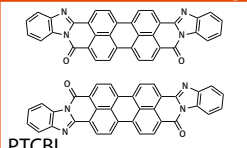
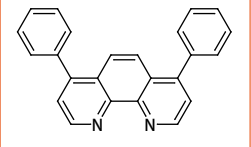
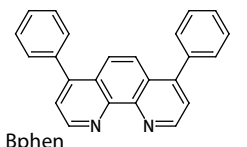
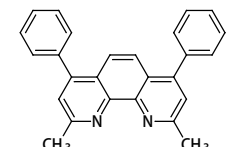
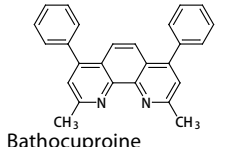
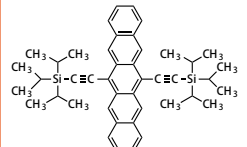
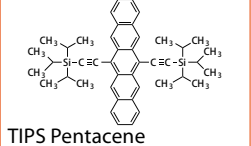
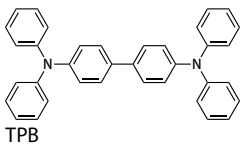
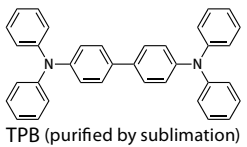
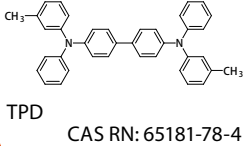
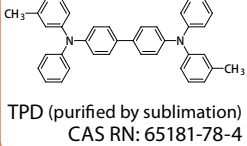
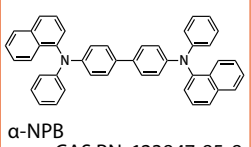
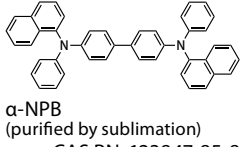
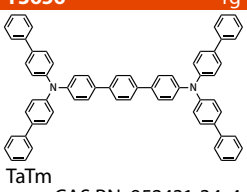
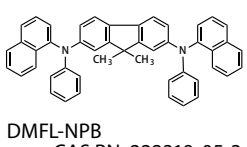
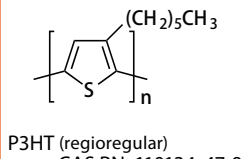
- 1) A. Kojima, K. Teshima, Y. Shirai, T. Miyasaka, *J. Am. Chem. Soc.* **2009**, *131*, 6050.
- 2) J. Burschka, N. Pellet, S.-J. Moon, R. Humphry-Baker, P. Gao, M. K. Nazeeruddin, M. Grätzel, *Nature* **2013**, *499*, 316.
- 3) M. Liu, M. B. Johnston, H. J. Snaith, *Nature* **2013**, *501*, 395.
- 4) H. Zhou, Q. Chen, G. Li, S. Luo, T.-B. Song, H.-S. Duan, Z. Hong, J. You, Y. Liu, Y. Yang, *Science* **2014**, *345*, 542.
- 5) W. S. Yang, J. H. Noh, N. J. Jeon, Y. C. Kim, S. Ryu, J. Seo, S. I. Seok, *Science* **2015**, *348*, 1234.
- 6) J. H. Noh, S. H. Im, J. H. Heo, T. N. Mandal, S. I. Seok, *Nano Lett.* **2013**, *13*, 1764.
- 7) A. Wakamiya, M. Endo, T. Sasamori, N. Tokitoh, Y. Ogomi, S. Hayase, Y. Murata, *Chem. Lett.* **2014**, *43*, 711.
- 8) A. Wakamiya, M. Endo, Y. Murata, Patent Pending, Appl. No. JP2014-008540.
- 9) Y. Yamada, T. Nakamura, M. Endo, A. Wakamiya, Y. Kanemitsu, *J. Am. Chem. Soc.* **2014**, *136*, 11610.
- 10) C. W. Tang, *Appl. Phys. Lett.* **1986**, *48*, 183.
- 11) C. J. Brabec, G. Zerza, G. Cerullo, S. De Silvestri, S. Luzzatti, J. C. Hummelen, N. S. Sariciftci, *Chem. Phys. Lett.* **2001**, *340*, 232.
- 12) J. C. Hummelen, B. W. Knight, F. LePeq, F. Wudl, J. Yao, C. L. Wilkins, *J. Org. Chem.* **1995**, *60*, 532.
- 13) Y. He, H.-Y. Chen, J. Hou, Y. Li, *J. Am. Chem. Soc.* **2010**, *132*, 1377.
- 14) M. M. Wienk, J. M. Kroon, W. J. H. Verhees, J. Knol, J. C. Hummelen, P. A. van Hal, R. A. J. Janssen, *Angew. Chem., Int. Ed.* **2003**, *42*, 3371.
- 15) S. H. Park, A. Roy, S. Beaupré, S. Cho, N. Coates, J. S. Moon, D. Moses, M. Leclerc, K. Lee, A. J. Heeger, *Nat. Photonics* **2009**, *3*, 297.
- 16) B. O'Regan, M. Grätzel, *Nature* **1991**, *353*, 737.
- 17) M. K. Nazeeruddin, P. Pechy, M. Grätzel, *Chem. Commun.* **1997**, 1705.
- 18) Review: M. Grätzel, *Inorg. Chem.* **2005**, *44*, 6841.
- 19) W. H. Howie, F. Claeysens, H. Miura, L. M. Peter, *J. Am. Chem. Soc.* **2008**, *130*, 1367.
- 20) R. Yoneya Ogura, S. Nakane, M. Morooka, M. Orihashi, Y. Suzuki, K. Noda, *Appl. Phys. Lett.* **2009**, *94*, 073308/1.
- 21) C.-P. Hsieh, H.-P. Lu, C.-L. Chiu, C.-W. Lee, S.-H. Chuang, C.-L. Mai, W.-N. Yen, S.-J. Hsu, E. W.-G. Diau, C.-Y. Yeh, *J. Mater. Chem.* **2010**, *20*, 1127.
- 22) A. Yella, H.-W. Lee, H. N. Tsao, C. Yi, A. K. Chandiran, M. K. Nazeeruddin, E. W.-G. Diau, C.-Y. Yeh, S. M. Zakeeruddin, M. Grätzel, *Science*, **2011**, *334*, 629.
- 23) J.-H. Yum, T. W. Holcombe, Y. Kim, K. Rakstys, T. Moehl, J. Teuscher, J. H. Delcamp, M. K. Nazeeruddin, M. Grätzel, *Sci. Rep.* **2013**, *3*, 2446.

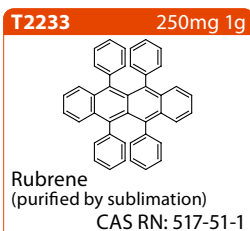
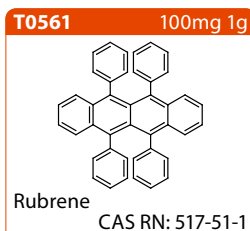
钙钛矿太阳能电池材料 Perovskite Solar Cell (PSC) Materials		卤化铅 Lead Halides		L0279 1g 5g 25g 100g 1kg PbI ₂ Lead(II) Iodide (99.99%, trace metals basis) [for Perovskite precursor] CAS RN: 10101-63-0	L0288 1g 5g 25g PbBr ₂ Lead(II) Bromide [for Perovskite precursor] CAS RN: 10031-22-8
L0346 1g 5g PbBr ₂ Lead(II) Bromide (Low water content) [for Perovskite precursor] CAS RN: 10031-22-8	L0291 1g 5g PbCl ₂ Lead(II) Chloride (purified by sublimation) [for Perovskite precursor] CAS RN: 7758-95-4	L0292 1g 5g 25g PbCl ₂ Lead(II) Chloride [for Perovskite precursor] CAS RN: 7758-95-4	C3570 1g 5g CsPbI ₃ Cesium Lead Triiodide (Low water content) CAS RN: 18041-25-3	C3569 1g 5g CsPbBr ₃ Cesium Lead Tribromide (Low water content) CAS RN: 15243-48-8	
其他铅化合物 Other Lead Compounds	L0315 1g 5g 25g  Lead(II) Acetate [for Perovskite precursor] CAS RN: 301-04-2	L0330 25g 100g  Lead(II) Acetate Trihydrate CAS RN: 6080-56-4	卤化铋 Bismuth Halides		B5787 5g 25g BiI ₃ Bismuth(III) Iodide Anhydrous CAS RN: 7787-64-6
卤化锡 Tin Halides	T3449 1g 5g SnI ₂ Tin(II) Iodide [for Perovskite precursor] CAS RN: 10294-70-9	T3573 1g 5g SnBr ₂ Tin(II) Bromide CAS RN: 10031-24-0	T3570 1g 5g SnCl ₂ Tin(II) Chloride CAS RN: 7772-99-8	卤化铯 Cesium Halides	
C2205 25g CsI Cesium Iodide CAS RN: 7789-17-5	C2202 25g 100g CsBr Cesium Bromide CAS RN: 7787-69-1	C2203 25g 100g CsCl Cesium Chloride CAS RN: 7647-17-8	有机鏷盐 Organic Onium Salts		碘化盐 Iodide Salts
M2556 1g 5g 25g 100g CH ₃ NH ₂ · HI Methylamine Hydroiodide (Low water content) CAS RN: 14965-49-2	E1045 1g 5g CH ₃ CH ₂ NH ₂ · HI Ethylamine Hydroiodide CAS RN: 506-58-1	P2212 1g 5g  Propylamine Hydroiodide CAS RN: 14488-45-0	B4433 1g 5g CH ₃ (CH ₂) ₃ NH ₂ · HI Butylamine Hydroiodide CAS RN: 36945-08-1	I0935 1g 5g  Isobutylamine Hydroiodide CAS RN: 205508-75-4	
B4434 1g 5g  tert-Butylamine Hydroiodide CAS RN: 39557-45-4	P2740 1g 5g  Pentylamine Hydroiodide CAS RN: 60762-85-8	I1095 1g 5g  Isopentylamine Hydroiodide	N1157 1g 5g  Neopentylamine Hydroiodide	O0485 1g 5g  n-Octylammonium Iodide CAS RN: 60734-63-6	
T3785 1g 5g  tert-Octylamine Hydroiodide	D5538 1g 5g CH ₃ (CH ₂) ₁₁ NH ₂ · HI Dodecylamine Hydroiodide CAS RN: 34099-97-3	C3532 1g 5g  Cyclohexylamine Hydroiodide CAS RN: 45492-87-3	C3425 1g 5g  Cyclohexanemethylamine Hydroiodide CAS RN: 2153504-15-3	A2778 1g 5g  Aniline Hydroiodide CAS RN: 45497-73-2	

F1273 1g 5g  4-Fluoroaniline Hydroiodide CAS RN: 85734-19-6	B4566 1g 5g  Benzylamine Hydroiodide (Low water content) CAS RN: 45579-91-7	F1228 1g 5g  4-Fluorobenzylamine Hydroiodide CAS RN: 2097121-30-5	T3838 1g 5g  4-(Trifluoromethyl)-benzylamine Hydroiodide		
F1203 1g 5g  4-Fluorophenethylamine Hydroiodide CAS RN: 1413269-55-2	M3240 1g 5g  2-(4-Methoxyphenyl)-ethylamine Hydroiodide	D4555 1g 5g  Dimethylamine Hydroiodide CAS RN: 51066-74-1	D4643 1g 5g  Diethylamine Hydroiodide CAS RN: 19833-78-4	D5769 5g  Diisopropylamine Hydroiodide CAS RN: 132396-99-7	
D5858 5g  Dibutylamine Hydroiodide CAS RN: 79886-80-9	P2486 1g 5g  Pyrrolidine Hydroiodide CAS RN: 45361-12-4	M3286 5g 25g  Morpholine Hydroiodide CAS RN: 58464-45-2	E1222 1g 5g  Ethylenediamine Dihydroiodide CAS RN: 5700-49-2	D5091 1g 5g  1,3-Diaminopropane Dihydroiodide CAS RN: 120675-53-8	
D5686 1g 5g  1,4-Diaminobutane Dihydroiodide CAS RN: 916849-52-0	D5616 1g 5g  2-(Dimethylamino)-ethylamine Dihydroiodide CAS RN: 244234-52-4	D5619 1g 5g  3-(Dimethylamino)-propylamine Dihydroiodide	D5861 5g  3-(Dimethylamino)-propylamine Dihydroiodide CAS RN: 99310-71-1	P2389 1g  1,4-Phenylenediamine Dihydroiodide CAS RN: 116469-02-4	
P2492 1g 5g  Piperazine Dihydroiodide CAS RN: 58464-47-4	D5252 1g 5g  1,4-Diazabicyclo[2.2.2]octane Dihydroiodide CAS RN: 33322-06-4	H1759 5g  1-Hexyl-1,4-diazabicyclo[2.2.2]octan-1-ium Iodide CAS RN: 1009321-13-4	F0974 1g 5g 25g  Formamidinium Hydroiodide (Low water content) CAS RN: 879643-71-7	F1263 1g 5g 25g  Formamidinium Hydroiodide (99.99%, trace metals basis) CAS RN: 879643-71-7	
A2902 1g 5g  Acetamidinium Hydroiodide (Low water content) CAS RN: 1452099-14-7	G0450 1g 5g  Guanidine Hydroiodide CAS RN: 19227-70-4	I0970 1g 5g  Imidazole Hydroiodide (Low water content) CAS RN: 68007-08-9	P2672 5g  Pyridine Hydroiodide CAS RN: 18820-83-2	A3093 1g 5g  5-Azoniaspiro[4.4]nonane Iodide CAS RN: 45650-35-9	
A2984 1g 5g  5-Aminovaleric Acid Hydroiodide (Low water content) CAS RN: 1705581-28-7	A3112 1g 5g  beta-Alanine Hydroiodide (Low water content) CAS RN: 2096495-59-7	溴化盐 Bromide Salts		M2589 1g 5g 25g  Methylamine Hydrobromide (Low water content) CAS RN: 6876-37-5	E0056 25g 500g  Ethylamine Hydrobromide CAS RN: 593-55-5
P2502 1g 5g  Propylamine Hydrobromide CAS RN: 4905-83-3	I1041 1g 5g  Isopropylamine Hydrobromide CAS RN: 29552-58-7	B5186 1g 5g  Butylamine Hydrobromide CAS RN: 15567-09-6	I1007 1g 5g  Isobutylamine Hydrobromide CAS RN: 74098-36-5	B5187 1g 5g  tert-Butylamine Hydrobromide CAS RN: 60469-70-7	

<p>P2739 1g 5g</p>  <p>Pentylamine Hydrobromide CAS RN: 7334-94-3</p>	<p>I1094 1g 5g</p>  <p>Isopentylamine Hydrobromide</p>	<p>N1156 1g 5g</p>  <p>Neopentylamine Hydrobromide</p>	<p>H1678 1g 5g</p>  <p>Hexylamine Hydrobromide CAS RN: 7334-95-4</p>	<p>O0442 1g 5g</p>  <p>n-Octylamine Hydrobromide CAS RN: 14846-47-0</p>
<p>T3783 1g 5g</p>  <p>tert-Octylamine Hydrobromide CAS RN: 1093859-61-0</p>	<p>D5537 1g 5g</p>  <p>Dodecylamine Hydrobromide CAS RN: 26204-55-7</p>	<p>M3287 1g 5g</p>  <p>2-Methoxyethylamine Hydrobromide CAS RN: 663941-77-3</p>	<p>C3531 1g 5g</p>  <p>Cyclohexanemethylamine Hydrobromide</p>	<p>A2985 1g 5g</p>  <p>Aniline Hydrobromide CAS RN: 542-11-0</p>
<p>F1272 5g 25g</p>  <p>4-Fluoroaniline Hydrobromide CAS RN: 85734-18-5</p>	<p>T3834 1g 5g</p>  <p>4-(Trifluoromethyl)aniline Hydrobromide CAS RN: 148819-81-2</p>	<p>B5185 1g 5g</p>  <p>Benzylamine Hydrobromide CAS RN: 37488-40-7</p>	<p>F1227 1g 5g</p>  <p>4-Fluorobenzylamine Hydrobromide CAS RN: 2270172-94-4</p>	<p>T3837 1g 5g</p>  <p>4-(Trifluoromethyl)benzylamine Hydrobromide</p>
<p>M3285 5g 25g</p>  <p>Morpholine Hydrobromide CAS RN: 6377-82-8</p>	<p>F1229 1g 5g</p>  <p>4-Fluorophenethylamine Hydrobromide CAS RN: 1807536-06-6</p>	<p>M3239 1g 5g</p>  <p>2-(4-Methoxyphenyl)ethylamine Hydrobromide</p>	<p>P2484 1g 5g</p>  <p>Pyrrolidine Hydrobromide CAS RN: 55810-80-5</p>	
<p>D5092 1g 5g</p>  <p>Dimethylamine Hydrobromide CAS RN: 6912-12-5</p>	<p>D4667 1g 5g</p>  <p>Diethylamine Hydrobromide CAS RN: 6274-12-0</p>	<p>D5853 5g</p>  <p>Dipropylamine Hydrobromide CAS RN: 7334-96-5</p>	<p>D5768 5g</p>  <p>Diisopropylamine Hydrobromide CAS RN: 30321-74-5</p>	<p>D5857 5g</p>  <p>Dibutylamine Hydrobromide CAS RN: 10435-44-6</p>
<p>E1221 1g 5g</p>  <p>Ethylenediamine Dihydrobromide CAS RN: 624-59-9</p>	<p>D5090 1g 5g</p>  <p>1,3-Diaminopropane Dihydrobromide CAS RN: 18773-03-0</p>	<p>D5685 1g 5g</p>  <p>1,4-Diaminobutane Dihydrobromide CAS RN: 18773-04-1</p>	<p>D5615 1g 5g</p>  <p>N,N-Dimethylethylenediamine Dihydrobromide CAS RN: 1245570-04-0</p>	<p>D5618 1g 5g</p>  <p>3-(Dimethylamino)propylamine Dihydrobromide</p>
<p>P2490 1g 5g</p>  <p>Piperazine Dihydrobromide CAS RN: 59813-05-7</p>	<p>D5250 1g 5g</p>  <p>1,4-Diazabicyclo[2.2.2]octane Dihydrobromide CAS RN: 54581-69-0</p>	<p>F0973 1g 5g 25g</p>  <p>Formamidine Hydrobromide (Low water content) CAS RN: 146958-06-7</p>	<p>F1244 1g 5g 25g</p>  <p>FABr (99.99%, trace metals basis) CAS RN: 146958-06-7</p>	<p>A3292 1g 5g</p>  <p>Acetamidine Hydrobromide CAS RN: 1040352-82-6</p>
<p>G0449 1g 5g</p>  <p>Guanidine Hydrobromide CAS RN: 19244-98-5</p>	<p>I1006 1g 5g</p>  <p>Imidazole Hydrobromide (Low water content) CAS RN: 101023-55-6</p>	<p>A3091 1g 5g</p>  <p>5-Azoniaspiro[4.4]nonane Bromide CAS RN: 16450-38-7</p>	<p>A3094 1g 5g</p>  <p>5-Aminovaleric Acid Hydrobromide (Low water content) CAS RN: 2173111-73-2</p>	<p>氯化盐 Chloride Salts</p>

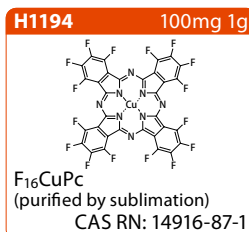
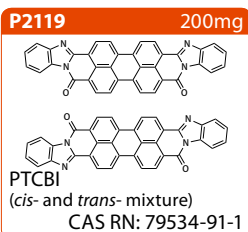
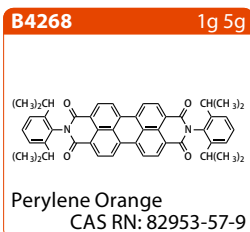
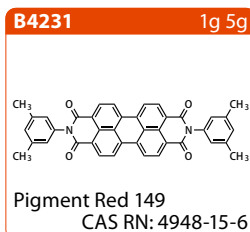
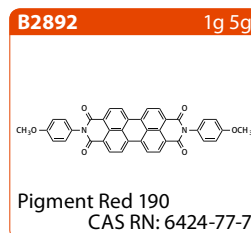
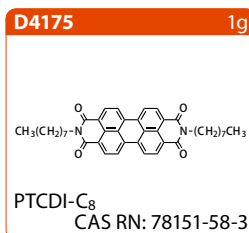
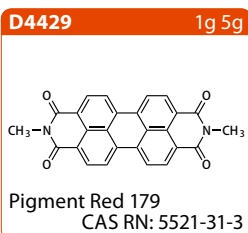
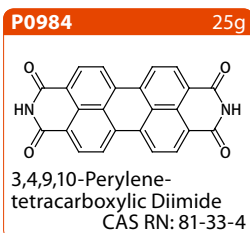
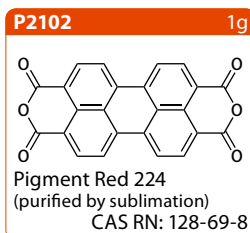
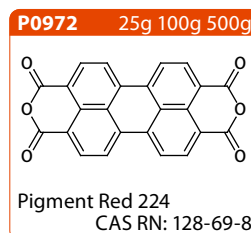
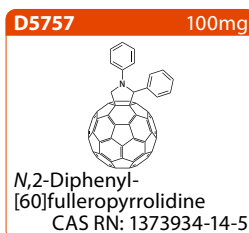
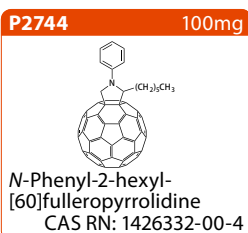
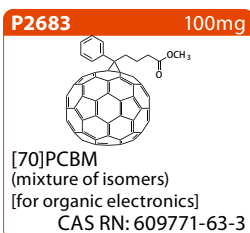
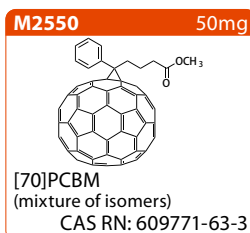
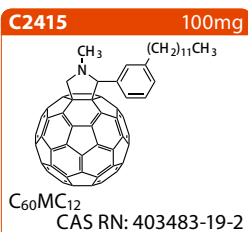
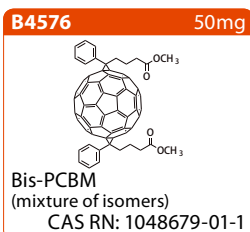
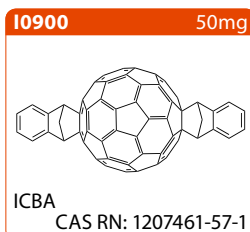
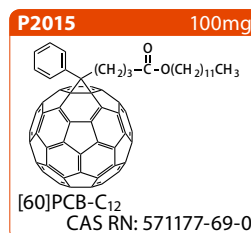
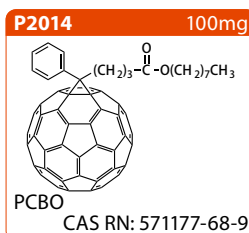
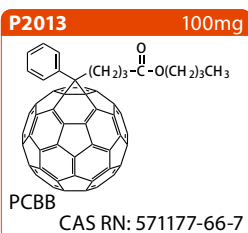
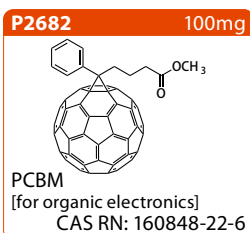
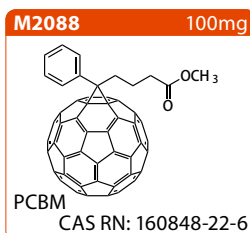
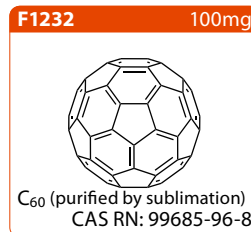
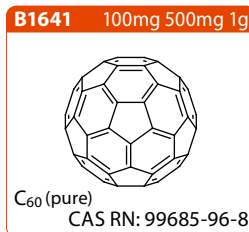
M0138 25g 500g $\text{CH}_3\text{NH}_2 \cdot \text{HCl}$ Methylamine Hydrochloride CAS RN: 593-51-1	E0205 25g 500g $\text{CH}_3\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Ethylamine Hydrochloride CAS RN: 557-66-4	F1250 1g 5g $\text{FCH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ 2-Fluoroethylamine Hydrochloride CAS RN: 460-08-2	P0522 25g $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Propylamine Hydrochloride CAS RN: 556-53-6	I0166 25g 100g 500g $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Isopropylamine Hydrochloride CAS RN: 15572-56-2
B0710 25g 500g $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Butylamine Hydrochloride CAS RN: 3858-78-4	I0096 25g 500g $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Isobutylamine Hydrochloride CAS RN: 5041-09-8	I0083 1g 5g $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Isopentylamine Hydrochloride CAS RN: 541-23-1	P2736 1g 5g $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ Pentylamine Hydrochloride CAS RN: 142-65-4	O0484 1g 5g $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot \text{HCl}$ <i>n</i> -Octylamine Hydrochloride CAS RN: 142-95-0
T3784 1g 5g $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CH}_2\text{C}(\text{CH}_3)_2\text{NH}_2 \cdot \text{HCl}$ <i>tert</i> -Octylamine Hydrochloride CAS RN: 58618-91-0	F1271 5g 25g $\text{NH}_2\text{C}_6\text{H}_4\text{F} \cdot \text{HCl}$ 4-Fluoroaniline Hydrochloride CAS RN: 2146-07-8	T3833 1g 5g $\text{NH}_2\text{C}_6\text{H}_4\text{CF}_3 \cdot \text{HCl}$ 4-(Trifluoromethyl)aniline Hydrochloride CAS RN: 90774-69-9	B0407 25g 100g 500g $\text{CH}_2\text{NH}_2\text{C}_6\text{H}_5 \cdot \text{HCl}$ Benzylamine Hydrochloride CAS RN: 3287-99-8	F1255 1g 5g $\text{CH}_2\text{NH}_2\text{C}_6\text{H}_4\text{F} \cdot \text{HCl}$ 4-Fluorobenzylamine Hydrochloride CAS RN: 659-41-6
T3836 1g 5g $\text{CH}_2\text{NH}_2\text{C}_6\text{H}_4\text{CF}_3 \cdot \text{HCl}$ 4-(Trifluoromethyl)benzylamine Hydrochloride CAS RN: 3047-99-2	A0436 1g 5g $\text{H}_2\text{NCH}_2\text{CH}_2\text{CH}_2\text{COOH} \cdot \text{HCl}$ 5-Aminovaleric Acid Hydrochloride (Low water content) CAS RN: 627-95-2	F1256 1g 5g $\text{CH}_2\text{CH}_2\text{NH}_2\text{C}_6\text{H}_4\text{F} \cdot \text{HCl}$ 4-Fluorophenethylamine Hydrochloride CAS RN: 459-19-8	M3284 5g 25g $\text{C}_4\text{H}_8\text{NO} \cdot \text{HCl}$ Morpholine Hydrochloride CAS RN: 10024-89-2	D0468 25g 500g $\text{CH}_3\text{CH}_2\text{N}(\text{CH}_3)_2 \cdot \text{HCl}$ Diethylamine Hydrochloride CAS RN: 660-68-4
D5253 1g 5g $\text{H}_2\text{NCH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot 2\text{HCl}$ 1,3-Diaminopropane Dihydrochloride (Low water content) CAS RN: 10517-44-9	D5617 1g 5g $\text{CH}_3\text{N}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot 2\text{HCl}$ <i>N,N</i> -Dimethyl-1,3-propanediamine Dihydrochloride CAS RN: 52198-63-7	D5860 5g $\text{CH}_3\text{N}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot 2\text{HCl}$ <i>N,N</i> -Diethylethylenediamine Dihydrochloride CAS RN: 52198-62-6	D5861 5g $\text{CH}_3\text{N}(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \cdot 2\text{HCl}$ 3-(Dimethylamino)propylamine Dihydroiodide CAS RN: 99310-71-1	A3393 5g $\text{CH}_2\text{CH}_2\text{NH}_2\text{C}_4\text{H}_8 \cdot 2\text{HCl}$ 2-(1-Pyrrolidinyl)ethanamine Dihydrochloride CAS RN: 65592-36-1
P2491 1g 5g $\text{C}_4\text{H}_{10}\text{N}_2 \cdot 2\text{HCl}$ Piperazine Dihydrochloride CAS RN: 142-64-3	D5251 1g 5g $\text{C}_{10}\text{H}_{16}\text{N}_2 \cdot 2\text{HCl}$ 1,4-Diazabicyclo[2.2.2]octane Dihydrochloride CAS RN: 49563-87-3	F0103 5g 25g $\text{H}_2\text{C}(\text{NH})\text{NH}_2 \cdot \text{HCl}$ Formamidine Hydrochloride CAS RN: 6313-33-3	A0008 25g 500g $\text{CH}_3\text{C}(\text{NH})\text{NH}_2 \cdot \text{HCl}$ Acetamidine Hydrochloride CAS RN: 124-42-5	G0162 25g 500g $\text{H}_2\text{N}-\text{C}(\text{NH})=\text{NH}_2 \cdot \text{HCl}$ Guanidine Hydrochloride CAS RN: 50-01-1
A3092 1g 5g $\text{C}_{13}\text{H}_{22}\text{N}_2^+\text{Cl}^-$ 5-Azoniaspiro[4.4]nonane Chloride CAS RN: 98997-63-8	类卤化盐 Pseudo Halide Salts		M2991 1g 5g $\text{CH}_3\text{NH}_2 \cdot \text{HSCN}$ Methylamine Thiocyanate CAS RN: 61540-63-4	F1153 1g 5g $\text{H}-\text{C}(\text{NH})=\text{NH}_2 \cdot \text{HSCN}$ Formamidine Thiocyanate CAS RN: 1821033-48-0
G0230 25g 500g $\text{H}_2\text{N}-\text{C}(\text{NH})=\text{NH}_2 \cdot \text{HSCN}$ Guanidine Thiocyanate CAS RN: 593-84-0	F1152 1g 5g $\text{H}-\text{C}(\text{NH}_2)=\text{NH}_2^+\text{BF}_4^-$ Formamidinium Tetrafluoroborate	M2990 1g 5g $\text{CH}_3\text{NH}_3^+\text{BF}_4^-$ Methylammonium Tetrafluoroborate CAS RN: 42539-74-2	M2989 1g 5g $\text{CH}_3\text{NH}_3^+\text{PF}_6^-$ Methylamine Hexafluorophosphate CAS RN: 28302-50-3	M3134 1g 5g $\text{CH}_3\text{NH}_2 \cdot \text{HOCN}$ Methylamine Cyanate CAS RN: 63405-91-4

<p>T0914 25g 100g 500g</p>  <p>Tetrabutylammonium Tetrafluoroborate CAS RN: 429-42-5</p>	<p>T2648 25g</p>  <p>Tetrabutylammonium Tetrafluoroborate (Br < 0.02 %) CAS RN: 429-42-5</p>	<p style="text-align: center;">载流子 传输材料</p> <p style="text-align: center;">Carrier Transport Materials</p>	<p>C3663 500mg</p>  <p>2PACz CAS RN: 20999-38-6</p>	<p>D5798 500mg</p>  <p>MeO-2PACz CAS RN: 237770-18-6</p>
<p>M3359 500mg</p>  <p>Me-4PACz</p>	<p>D5155 200mg</p>  <p>H101 CAS RN: 1622008-73-4</p>	<p>B5672 1g 5g 25g</p>  <p>TOP-HTM-α1 CAS RN: 872466-50-7</p>	<p>T3722 1g 5g 25g</p>  <p>TOP-HTM-α2</p>	<p>B1641 100mg 500mg 1g</p>  <p>C₆₀ (pure) CAS RN: 99685-96-8</p>
<p>F1232 100mg</p>  <p>C₆₀ (purified by sublimation) CAS RN: 99685-96-8</p>	<p>M2088 100mg</p>  <p>PCBM CAS RN: 160848-22-6</p>	<p>P2682 100mg</p>  <p>PCBM [for organic electronics] CAS RN: 160848-22-6</p>	<p>B1694 100mg</p>  <p>Fullerene C₇₀ CAS RN: 115383-22-7</p>	<p>F1233 100mg</p>  <p>Fullerene C₇₀ [for organic electronics] CAS RN: 115383-22-7</p>
<p>B4576 50mg</p>  <p>Bis-PCBM (mixture of isomers) CAS RN: 1048679-01-1</p>	<p>M2550 50mg</p>  <p>[70]PCBM (mixture of isomers) CAS RN: 609771-63-3</p>	<p>P2683 100mg</p>  <p>[70]PCBM (mixture of isomers) [for organic electronics] CAS RN: 609771-63-3</p>	<p>P2744 100mg</p>  <p>N-Phenyl-2-hexyl-[60]fulleropyrrolidine CAS RN: 1426332-00-4</p>	<p>D5757 100mg</p>  <p>N,2-Diphenyl-[60]fulleropyrrolidine CAS RN: 1373934-14-5</p>
<p>P0767 1g 5g 25g</p>  <p>Zinc Phthalocyanine CAS RN: 14320-04-8</p>	<p>Z0037 500mg</p>  <p>ZnPc (purified by sublimation) CAS RN: 14320-04-8</p>	<p>P1628 1g</p>  <p>CuPc (purified by sublimation) CAS RN: 147-14-8</p>	<p>C3645 100mg 500mg</p>  <p>CuPc (purified by sublimation) [for organic electronics] CAS RN: 147-14-8</p>	<p>P2119 200mg</p>  <p>PTCBI (cis- and trans- mixture) CAS RN: 79534-91-1</p>
<p>D0905 1g 5g</p>  <p>Bphen CAS RN: 1662-01-7</p>	<p>B2695 1g</p>  <p>Bphen (purified by sublimation) CAS RN: 1662-01-7</p>	<p>D0711 1g 5g</p>  <p>Bathocuproine CAS RN: 4733-39-5</p>	<p>B2694 1g 5g</p>  <p>Bathocuproine (purified by sublimation) CAS RN: 4733-39-5</p>	<p>B3562 100mg</p>  <p>TIPS Pentacene CAS RN: 373596-08-8</p>
<p>B5942 100mg</p>  <p>TIPS Pentacene [for organic electronics] CAS RN: 373596-08-8</p>	<p>T1812 5g 25g</p>  <p>TPB CAS RN: 15546-43-7</p>	<p>T3266 1g 5g</p>  <p>TPB (purified by sublimation) CAS RN: 15546-43-7</p>	<p>D2448 1g 5g</p>  <p>TPD CAS RN: 65181-78-4</p>	<p>D3236 1g 5g</p>  <p>TPD (purified by sublimation) CAS RN: 65181-78-4</p>
<p>D5126 1g 5g</p>  <p>α-NPB CAS RN: 123847-85-8</p>	<p>D3970 1g 5g</p>  <p>α-NPB (purified by sublimation) CAS RN: 123847-85-8</p>	<p>T3656 1g</p>  <p>TaTm CAS RN: 952431-34-4</p>	<p>B4926 200mg 1g</p>  <p>DMFL-NPB CAS RN: 222319-05-3</p>	<p>P2513 100mg 500mg</p>  <p>P3HT (regioregular) CAS RN: 110134-47-9</p>

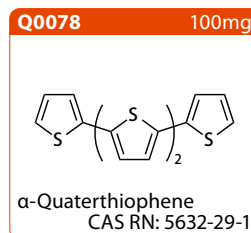
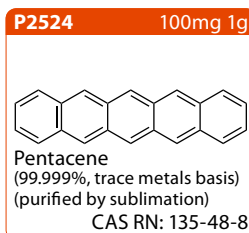
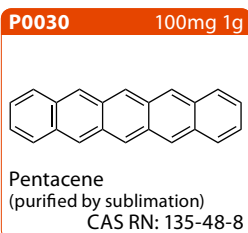
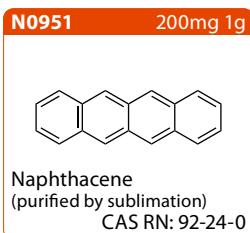
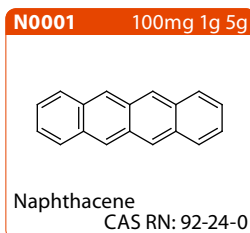


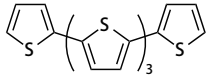
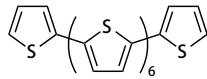
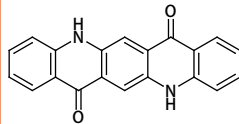
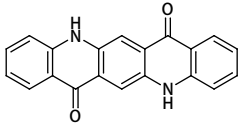
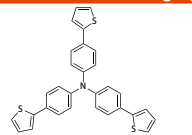
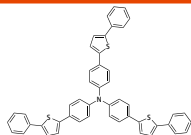
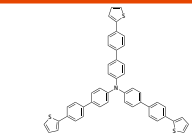
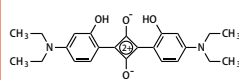
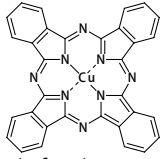
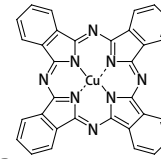
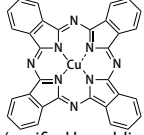
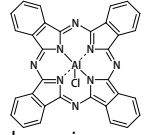
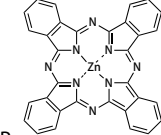
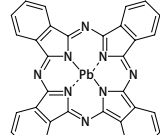
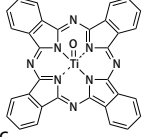
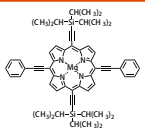
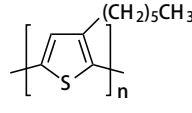
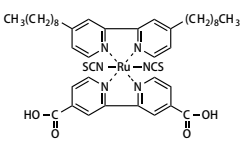
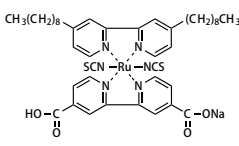
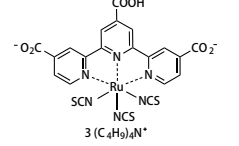
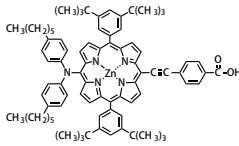
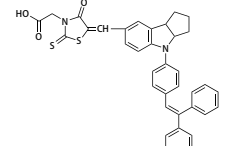
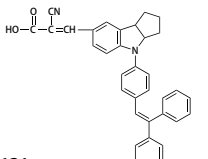
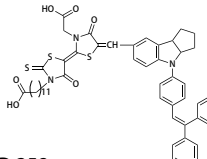
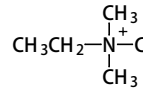
有机太阳能电池材料
Organic Solar Cell
(OPV) Materials

受体材料
Acceptor Materials



供体材料
Donor Materials



<p>Q0079 100mg 500mg</p>  <p>α-Quinquethiophene CAS RN: 5660-45-7</p>	<p>S0504 100mg 1g</p>  <p>6T (purified by sublimation) CAS RN: 88493-55-4</p>	<p>S0505 100mg</p>  <p>α-Septithiophene CAS RN: 86100-63-2</p>	<p>O0313 100mg</p>  <p>α-Octithiophene CAS RN: 113728-71-5</p>	<p>Q0057 5g 25g</p>  <p>Quinacridone CAS RN: 1047-16-1</p>
<p>Q0083 1g</p>  <p>Quinacridone (purified by sublimation) CAS RN: 1047-16-1</p>	<p>T3050 1g 5g</p>  <p>Tris[4-(2-thienyl)phenyl]amine CAS RN: 142807-63-4</p>	<p>T3328 200mg</p>  <p>Tris[4-(5-phenylthiophen-2-yl)phenyl]amine CAS RN: 803727-09-5</p>	<p>T3337 200mg</p>  <p>Tris[4'-(2-thienyl)-4-biphenyl]amine CAS RN: 1092356-36-9</p>	<p>B4342 1g 5g</p>  <p>2,4-Bis[4-(diethylamino)-2-hydroxyphenyl]-squaraine CAS RN: 68842-66-0</p>
<p>B4649 1g 5g</p>  <p>2,4-Bis[8-hydroxy-1,1,7,7-tetramethyljulolidin-9-yl]-squaraine CAS RN: 358727-55-6</p>	<p>P1005 25g 250g</p>  <p>CuPc (α-form) CAS RN: 147-14-8</p>	<p>P1006 25g 100g 500g</p>  <p>CuPc (β-form) CAS RN: 147-14-8</p>	<p>P0655 25g</p>  <p>CuPc CAS RN: 147-14-8</p>	<p>P1628 1g</p>  <p>CuPc (purified by sublimation) CAS RN: 147-14-8</p>
<p>C3645 100mg 500mg</p>  <p>CuPc (purified by sublimation) [for organic electronics] CAS RN: 147-14-8</p>	<p>C1167 1g 5g</p>  <p>Phthalocyanine Chloroaluminum CAS RN: 14154-42-8</p>	<p>P0767 1g 5g 25g</p>  <p>ZnPc CAS RN: 14320-04-8</p>	<p>Z0037 500mg</p>  <p>ZnPc (purified by sublimation) CAS RN: 14320-04-8</p>	<p>P0766 1g 25g</p>  <p>Lead(II) Phthalocyanine CAS RN: 15187-16-3</p>
<p>T2272 200mg 1g</p>  <p>TiOPc (purified by sublimation) CAS RN: 26201-32-1</p>	<p>B4314 50mg</p>  <p>[5,15-Bis(phenylethynyl)-10,20-bis((triisopropylsilyl)ethynyl)-porphyrinato]magnesium(II) CAS RN: 1397288-30-0</p>	<p>P2513 100mg 500mg</p>  <p>P3HT (regioregular) CAS RN: 110134-47-9</p>	<p>P2710 100mg</p>  <p>PBTTDP CAS RN: 1240372-42-2</p>	
<p>染料敏化太阳能电池材料 Dye-Sensitized Solar Cell (DSSC) Materials</p>		<p>染料敏化剂 Dye Sensitizers</p>		
<p>B4373 200mg</p>  <p>Z907 Dye CAS RN: 502693-09-6</p>	<p>B4432 200mg</p>  <p>Z907 Dye Sodium Salt CAS RN: 871466-65-8</p>	<p>N1104 100mg</p>  <p>N749 Black Dye CAS RN: 359415-47-7</p>	<p>Y0011 50mg</p>  <p>YD2 CAS RN: 1201915-91-4</p>	<p>D4430 50mg</p>  <p>D 102 CAS RN: 652145-28-3</p>
<p>D4431 50mg</p>  <p>D 131 CAS RN: 652145-29-4</p>	<p>D4432 50mg</p>  <p>D 358 CAS RN: 1207638-53-6</p>	<p>电解质 Electrolytes</p>		<p>T0139 25g 100g 500g</p>  <p>Tetramethylammonium Iodide CAS RN: 75-58-1</p>
				<p>E0190 25g</p>  <p>Ethyltrimethylammonium Iodide CAS RN: 51-93-4</p>

T0097 25g 100g 500g Tetraethylammonium iodide CAS RN: 68-05-3	E0191 25g Ethyltripropylammonium iodide CAS RN: 15066-80-5	T0172 25g 100g Tetrapropylammonium iodide CAS RN: 631-40-3	T0057 25g 100g 500g Tetrabutylammonium iodide CAS RN: 311-28-4	T1011 5g 25g Tetraamylammonium iodide CAS RN: 2498-20-6
T1010 5g 25g Tetrahexylammonium iodide CAS RN: 2138-24-1	T1396 25g Tetraheptylammonium iodide CAS RN: 3535-83-9	P0246 25g Trimethylphenylammonium iodide CAS RN: 98-04-4	P0242 5g 25g Triethylphenylammonium iodide CAS RN: 1010-19-1	M1455 5g 25g Tributylmethylphosphonium iodide CAS RN: 1702-42-7
M0253 25g 100g 500g Methyltriphenylphosphonium iodide CAS RN: 2065-66-9	E0549 25g 250g Ethyltriphenylphosphonium iodide CAS RN: 4736-60-1	I0552 5g 25g Isopropyltriphenylphosphonium iodide CAS RN: 24470-78-8	T1450 10g Tetraphenylphosphonium iodide CAS RN: 2065-67-0	T1056 25g 500g Trimethylsulfonium iodide CAS RN: 2181-42-2
T1564 1g Tributylsulfonium iodide CAS RN: 18146-62-8	钴掺杂空穴导体 Hole Conductor Cobalt Dopants		T3255 1g 5g Tris(2,2'-bipyridine)-cobalt(II) Bis(hexafluorophosphate) CAS RN: 79151-78-3	T3256 200mg 1g Tris(2,2'-bipyridine)-cobalt(III) Tris(hexafluorophosphate) CAS RN: 28277-53-4
T3554 1g 5g Tris(1,10-phenanthroline)-cobalt(III) Tris(hexafluorophosphate) CAS RN: 28277-59-0	配体 Ligands		B1876 100mg 1g 2,2'-Biisonicotinic Acid CAS RN: 6813-38-3	D4635 1g 5g Dimethyl 2,2'-Bipyridine-4,4'-dicarboxylate CAS RN: 71071-46-0
B4420 200mg 4,4'-Bis(5-hexyl-2-thienyl)-2,2'-bipyridyl CAS RN: 1047684-56-9	B3509 1g 5g 2,2'-Bicinchoninic Acid CAS RN: 1245-13-2	B4509 1g 5g Bicinchoninic Acid Disodium Salt CAS RN: 979-88-4	T3245 200mg 1g 2,2':6',2''-Terpyridine-4'-carboxylic Acid CAS RN: 148332-36-9	M2464 100mg Methyl 2,2':6',2''-Terpyridine-4'-carboxylate CAS RN: 247058-06-6
T2959 200mg Trimethyl 2,2':6',2''-Terpyridine-4,4',4''-tricarboxylate CAS RN: 330680-46-1	P2239 1g 5g 2-(1-Pyrazolyl)pyridine CAS RN: 25700-11-2	D4672 1g 5g 2,6-Di(1-pyrazolyl)-pyridine CAS RN: 123640-38-0		



梯希爱(上海)化成工业发展有限公司

试剂热线：800-988-0390或021-67121386

大包装热线：800-988-1865

传真：021-67121385

邮箱：Sales-CN@TCIchemicals.com

地址：上海化学工业区普工路96号

邮编：201507

www.TCIchemicals.com