

太陽電池材料

Solar Cell Materials



ペロブスカイト太陽電池 (PSC) 材料

有機薄膜太陽電池 (OPV) 材料

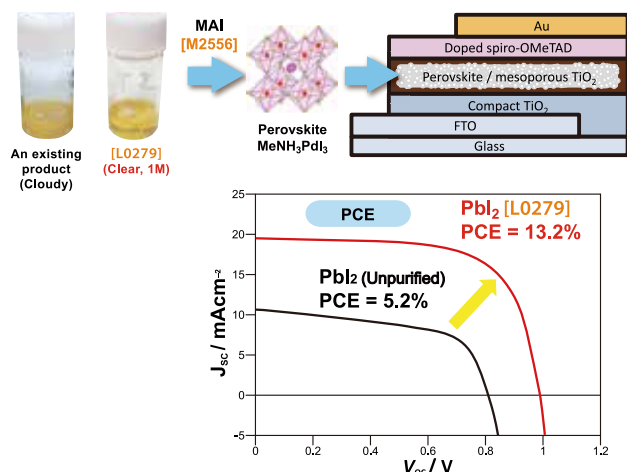
色素増感太陽電池 (DSSC) 材料

太陽電池材料

太陽光は再生可能エネルギーの一つであり、21世紀の地球規模の環境・エネルギー問題を解決する新しいエネルギー源として注目を集めています。太陽光エネルギーを出来るだけ有効に活用するため、安価で高効率な太陽電池の実現に向けた研究開発が活発に行われています。現在、主に実用化されているシリコン太陽電池は製造コストが高く、他の無機物系太陽電池も同様の問題を抱えています。このような背景により、有機材料あるいは有機無機ハイブリッド材料を主体とする新型の太陽電池開発が盛んに行われています。

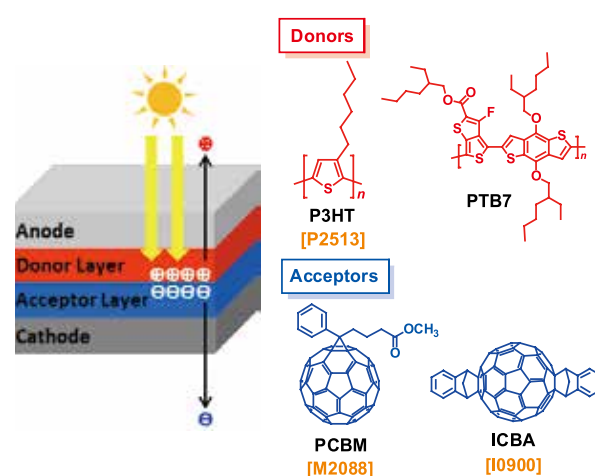
1. ペロブスカイト太陽電池(PSC)材料

近年注目を集めているペロブスカイト太陽電池は、2009年に宮坂らによって報告されました¹⁾。有機無機ハイブリッド構造を有するペロブスカイト結晶 RNH_3PbX_3 ($\text{X} = \text{Cl, Br, I}$; $\text{R} = \text{Me, NH=CH, etc}$)が、光吸収層として機能します。2012年以降、驚異的な速さでエネルギー変換効率(PCE)が改善され、有機薄膜太陽電池(OPV)や色素増感太陽電池(DSSC)を凌ぎ15%以上となっています²⁻⁵⁾。ペロブスカイト太陽電池のデバイスは、溶液塗布による作成が可能であり、低コストにデバイスが製造できると期待されています。有機無機ペロブスカイト RNH_3PbX_3 は、有機アミンHX塩とハロゲン化鉛を混合するだけで容易に合成可能です。ペロブスカイト化合物のハロゲン部位Xを変えることで、吸収波長の範囲を変えることが可能です⁶⁾。Xが臭素の場合は比較的短波長側の光吸収に有利であり、ヨウ素の場合は長波長側の光吸収まで幅広く対応しています。若宮らは、十分に脱水されたヨウ化鉛をペロブスカイトの原料に用いることで、10%以上の安定した太陽電池デバイスが作成できることを報告しています^{7,8)}。ペロブスカイト層におけるキャリアの振舞いはOPVのそれとは異なり、電子と正孔が独立に運動する自由キャリアを持つことが明らかにされています⁹⁾。これにより、ペロブスカイト層は、電子と正孔の両方を再結合なく長距離に輸送できる特徴を有しています。



2. 有機薄膜太陽電池(OPV)材料

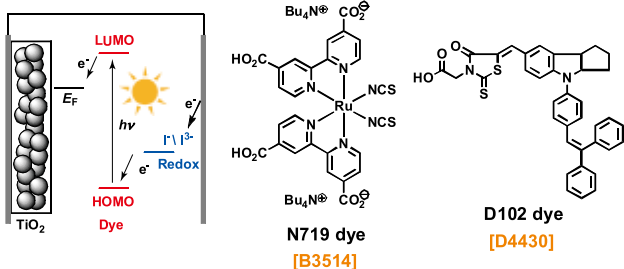
有機薄膜太陽電池(OPV: Organic Photovoltaics)は、Tangにより有機薄膜太陽電池のプロトタイプが1986年に報告されています¹⁰⁾。OPVの製造には、印刷法やロール・ツー・ロール法など、低コストで生産性の高い製造技術を用いることが可能です。OPVデバイスには通常、電子供与体(p型半導体)と電子受容体(n型半導体)を接合したバルクヘテロ接合(BHJ)が使われており¹¹⁾、前者は π 共役系ポリマーや低分子半導体、後者は主にフラレン誘導体を用いられています。効率の良いバルクヘテロ接合を作成するために、フラレンの溶解度を改良したPCBMが用いられ¹²⁾、さらにPCBMに比べて高いLUMO準位を持つICBAを用いると高い解放電圧を与える傾向があります¹³⁾。 C_{60} フラレン誘導体に比べると、 C_{70} 体の方が光吸収効率に優れており、太陽電池効率は高くなる傾向があります¹⁴⁾。一方、p型半導体である π 共役系ポリマーに電子不足の部位(アクセプター)を導入し、ドナー・アクセプター型(DA型)ポリマーとすることで、電荷移動に基づく長波長吸収が可能となります¹⁵⁾。



3. 色素増感太陽電池(DSSC)材料

色素増感太陽電池(DSSC)は、Grätzelらによって1991年に見出されています¹⁶⁾。DSSCはナノポーラスな酸化チタン(TiO_2)半導体電極、有機増感色素およびレドックス電解質を含む電解液からなる液体式のデバイスであることが特徴です。他の太陽電池に比べてその素子構造が単純であり、低コストの太陽電池として期待されています¹⁷⁾。DSSCは弱い光量での発電にも向いており、窓ガラスや室内などに設置可能なため、私たちの生活に身近な存在になると言われています。有機増感色素として最もポピュラーなものは、中心金属としてルテニウムを有するピリジン錯体色素です¹⁸⁾。これらの錯体のポリピリジル配位子には、 TiO_2 とリンカーを形成するためのカルボキシル基の他、リン酸基なども用いることが可能です。ルテニウムは貴金属で高価なことから、金属を含まない有機増感色素(D-102、D-131、D-358など)の開発もあ











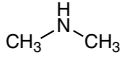
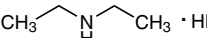
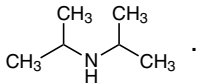
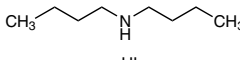

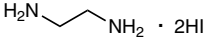
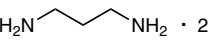

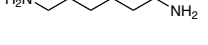
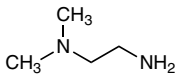
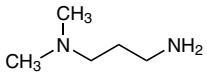
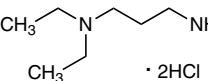
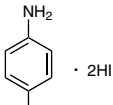
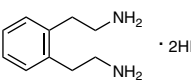
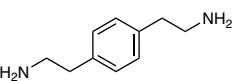


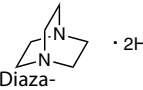
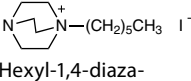
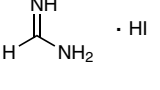
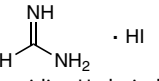
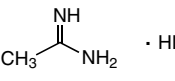
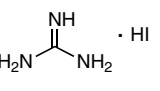


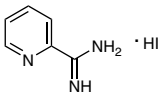
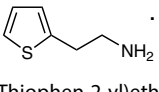
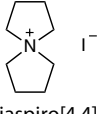
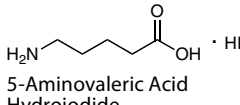
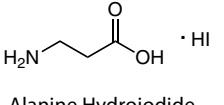
こなわれています^{19,20)}。近年、中心金属に垂鉛を有するポルフィリン錯体色素が開発され、10%以上のPCEを示す高効率な緑色のDSSC色素として報告されています^{21,22)}。また、PCE10%以上を示す青色のDSSC色素として、金属を含まないジケトピロロピロール骨格を持つ有機色素が開発されています²³⁾。



文献







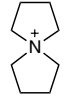
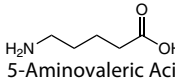
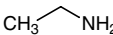
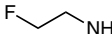
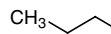
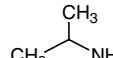
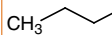
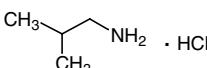
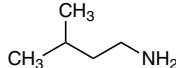
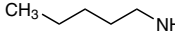
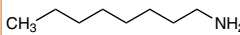
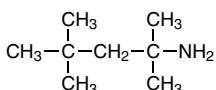
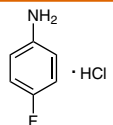
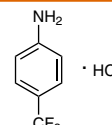

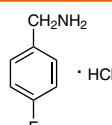
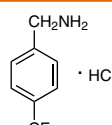
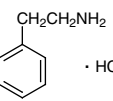
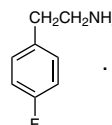

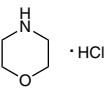
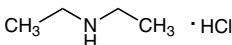
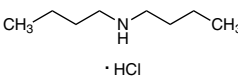
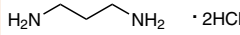
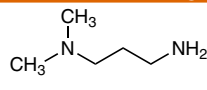
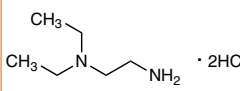
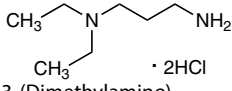
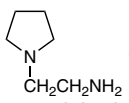
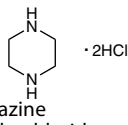



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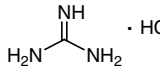
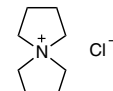
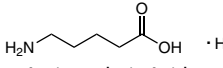
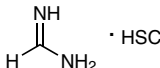
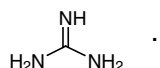
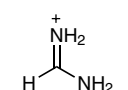
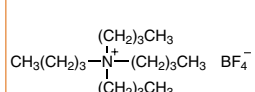
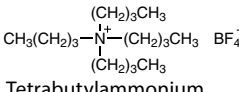
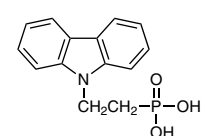
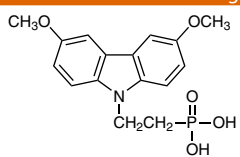
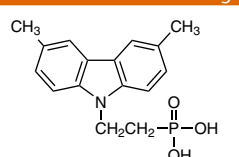
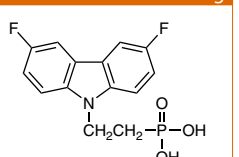
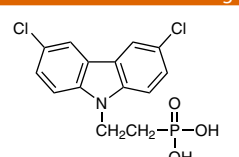
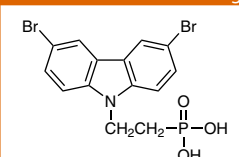
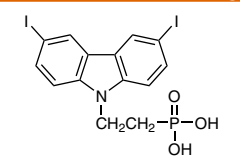
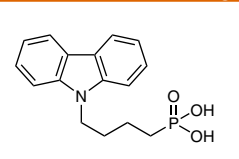
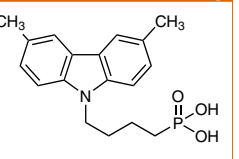
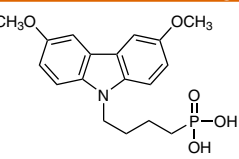
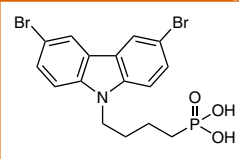
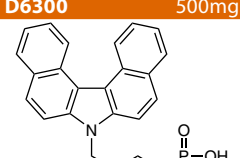
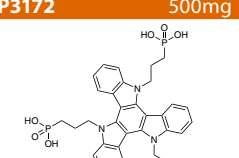
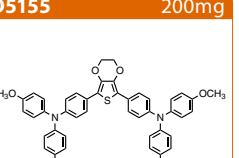
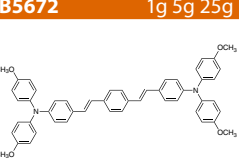
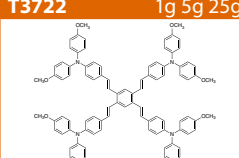
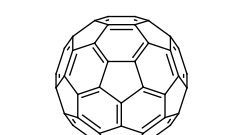

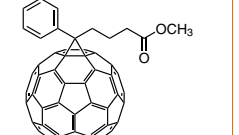
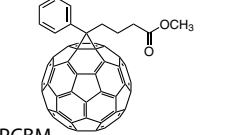
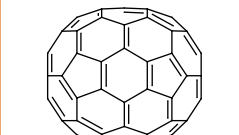

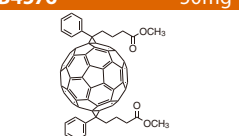
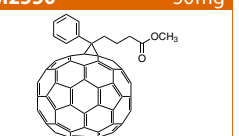
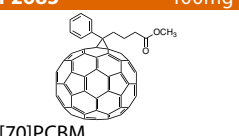
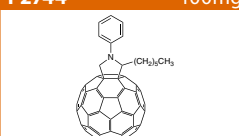
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|--|--|---|--|--|---|
| <p>ペロブスカイト太陽電池 (PSC) 材料</p> | | <p>ハロゲン化鉛</p> | | <p>L0279 1g 5g 25g 100g 1kg</p> <p>PbI₂ Lead(II) Iodide (99.99%, trace metals basis) [for Perovskite precursor] CAS RN: 10101-63-0</p> | <p>L0288 1g 5g 25g 100g</p> <p>PbBr₂ Lead(II) Bromide [for Perovskite precursor] CAS RN: 10031-22-8</p> |
| | | <p>L0346 1g 5g 25g 100g</p> <p>PbBr₂ Lead(II) Bromide (Low water content) [for Perovskite precursor] CAS RN: 10031-22-8</p> | <p>L0291 1g 5g</p> <p>PbCl₂ Lead(II) Chloride (purified by sublimation) [for Perovskite precursor] CAS RN: 7758-95-4</p> | <p>L0292 1g 5g 25g</p> <p>PbCl₂ Lead(II) Chloride [for Perovskite precursor] CAS RN: 7758-95-4</p> | <p>C3570 1g 5g</p> <p>CsPbI₃ Cesium Lead Triiodide (Low water content) CAS RN: 18041-25-3</p> |
| <p>その他の鉛化合物</p> | | <p>L0315 1g 5g 25g</p> <p> Lead(II) Acetate [for Perovskite precursor] CAS RN: 301-04-2</p> | <p>L0330 25g 100g</p> <p> Lead(II) Acetate Trihydrate CAS RN: 6080-56-4</p> | <p>ハロゲン化ビスマス</p> | |
| | | <p>B5787 5g 25g</p> <p>BiI₃ Bismuth(III) Iodide Anhydrous CAS RN: 7787-64-6</p> | | | |
| <p>B6339 5g 25g</p> <p>BiBr₃ Bismuth(III) Bromide CAS RN: 7787-58-8</p> | <p>B3546 25g 250g</p> <p>BiCl₃ Bismuth(III) Chloride CAS RN: 7787-60-2</p> | <p>ハロゲン化スズ</p> | | <p>T3449 1g 5g</p> <p>SnI₂ Tin(II) Iodide [for Perovskite precursor] CAS RN: 10294-70-9</p> | <p>T3573 1g 5g</p> <p>SnBr₂ Tin(II) Bromide CAS RN: 10031-24-0</p> |
| <p>T3570 1g 5g</p> <p>SnCl₂ Tin(II) Chloride [for Perovskite precursor] CAS RN: 7772-99-8</p> | <p>ハロゲン化セシウム</p> | | <p>C2205 25g</p> <p>CsI Cesium Iodide CAS RN: 7789-17-5</p> | <p>C2202 25g 100g</p> <p>CsBr Cesium Bromide CAS RN: 7787-69-1</p> | <p>C2203 25g 100g</p> <p>CsCl Cesium Chloride CAS RN: 7647-17-8</p> |
| <p>有機オニウム塩</p> | | <p>ヨウ化物塩</p> | | <p>M2556 1g 5g 25g 100g</p> <p>CH₃NH₂ · HI Methylamine Hydroiodide (Low water content) CAS RN: 14965-49-2</p> | <p>E1045 1g 5g</p> <p>CH₃CH₂NH₂ · HI Ethylamine Hydroiodide CAS RN: 506-58-1</p> |
| | | <p>P2212 1g 5g</p> <p> Propylamine Hydroiodide CAS RN: 14488-45-0</p> | | | |
| <p>B4433 1g 5g</p> <p>CH₃(CH₂)₃NH₂ · HI Butylamine Hydroiodide CAS RN: 36945-08-1</p> | <p>I0935 1g 5g</p> <p> Isobutylamine Hydroiodide CAS RN: 205508-75-4</p> | <p>B4434 1g 5g</p> <p> tert-Butylamine Hydroiodide CAS RN: 39557-45-4</p> | <p>P2740 1g 5g</p> <p>CH₃(CH₂)₄NH₂ · HI Pentylamine Hydroiodide CAS RN: 60762-85-8</p> | <p>I1095 1g 5g</p> <p> Isopentylamine Hydroiodide CAS RN: 2733412-76-3</p> | |
| <p>N1157 1g 5g</p> <p> Neopentylamine Hydroiodide CAS RN: 2733412-38-7</p> | <p>H1679 5g</p> <p>CH₃(CH₂)₅NH₂ · HI 1-Hexanamine Hydroiodide CAS RN: 54285-91-5</p> | <p>O0485 1g 5g</p> <p>CH₃(CH₂)₇NH₂ · HI 1-Octanamine Hydroiodide CAS RN: 60734-63-6</p> | <p>T3785 1g 5g</p> <p> tert-Octylamine Hydroiodide CAS RN: 2733942-06-6</p> | <p>D5538 1g 5g</p> <p>CH₃(CH₂)₁₁NH₂ · HI Dodecylamine Hydroiodide CAS RN: 34099-97-3</p> | |

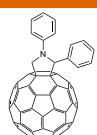
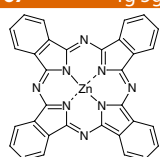
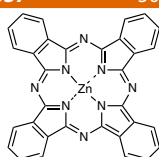
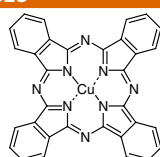
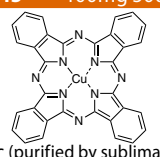
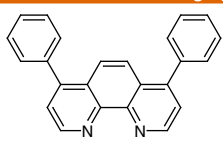
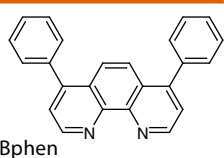
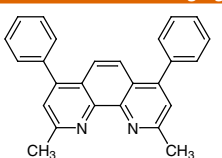
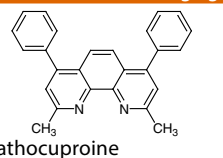
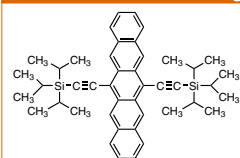
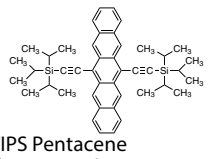
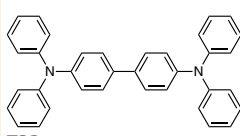
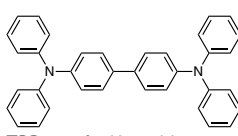
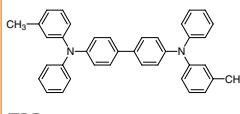
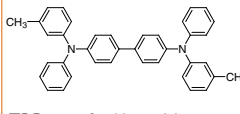
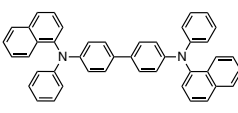
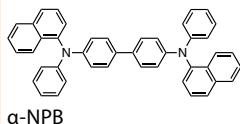
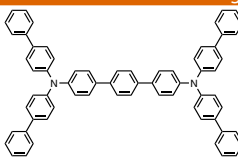
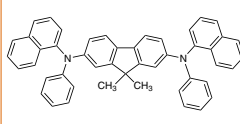
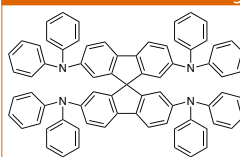
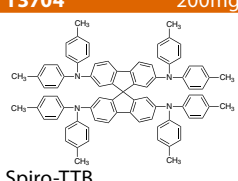
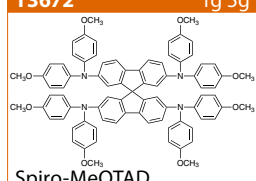
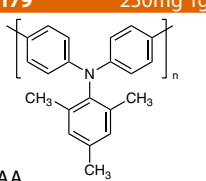
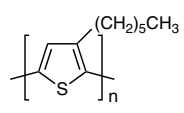
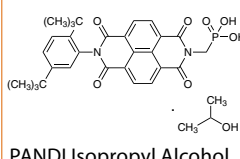
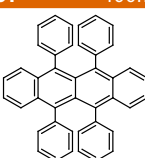
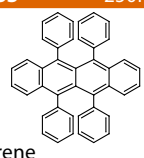
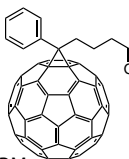
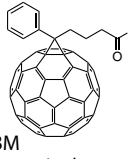
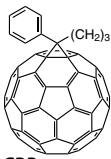
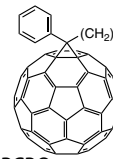
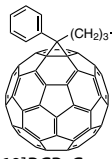
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| <p>F1263 1g 5g 25g</p>  <p>Formamidine Hydroiodide (99.99%, trace metals basis) [for Perovskite precursor] CAS RN: 879643-71-7</p> | <p>A2902 1g 5g</p>  <p>Acetamidine Hydroiodide (Low water content) CAS RN: 1452099-14-7</p> | <p>G0450 1g 5g</p>  <p>Guanidine Hydroiodide CAS RN: 19227-70-4</p> | <p>I0970 1g 5g</p>  <p>Imidazole Hydroiodide (Low water content) CAS RN: 68007-08-9</p> | <p>P2672 5g</p>  <p>Pyridine Hydroiodide CAS RN: 18820-83-2</p> |
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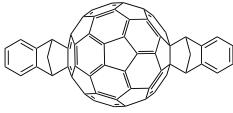
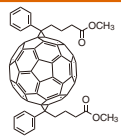
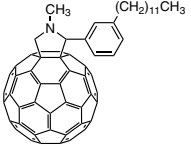
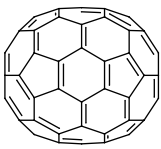
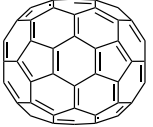
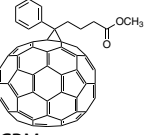
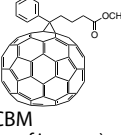
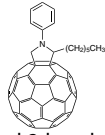
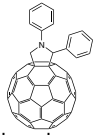
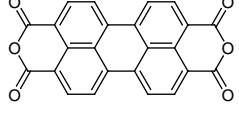
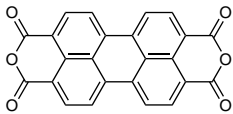
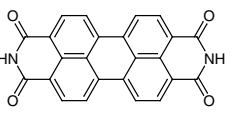
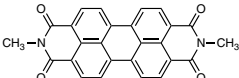
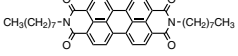
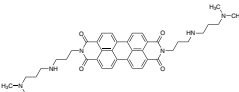
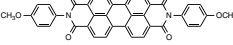
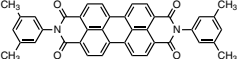
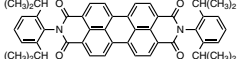
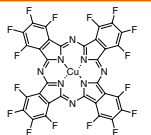
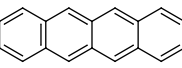
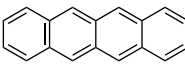
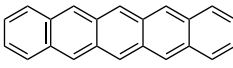
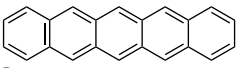
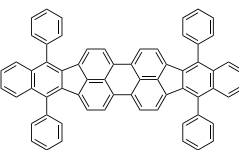
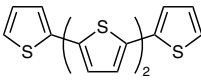
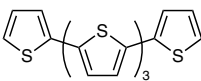
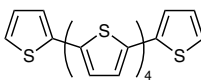
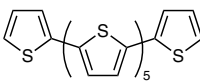
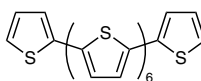
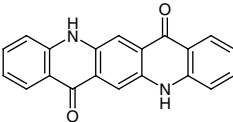
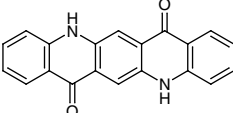
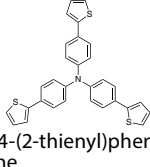
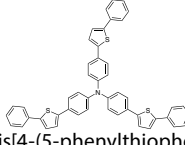
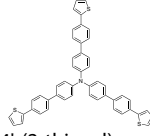
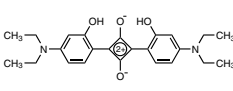
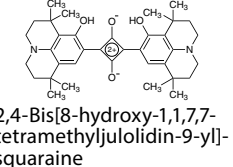
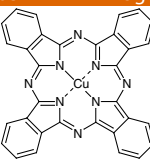
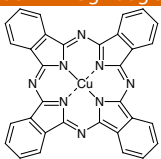
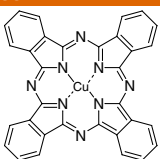
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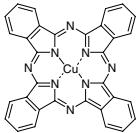
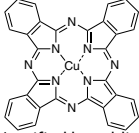
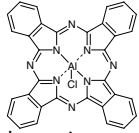
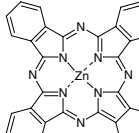
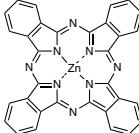
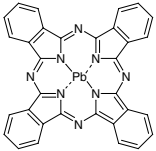
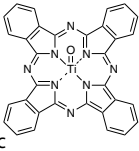
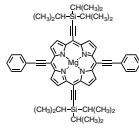
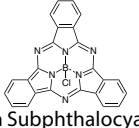
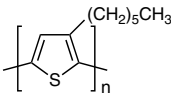
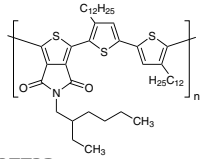
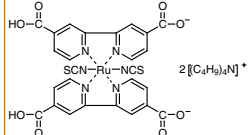
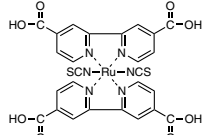
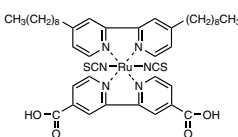
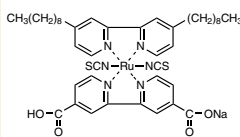
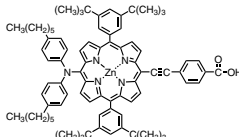
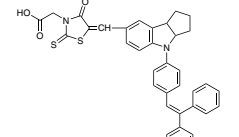
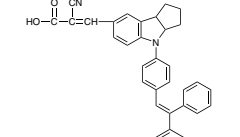
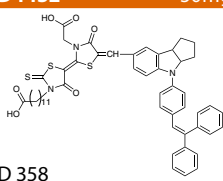
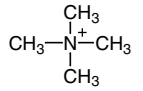
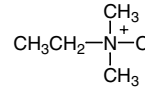
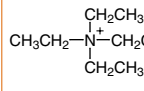
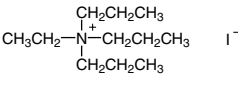
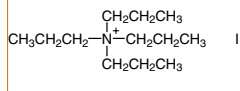
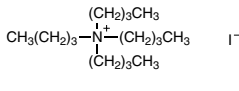
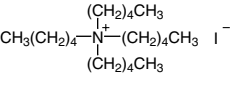
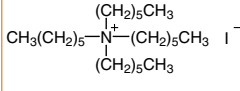
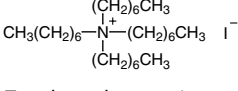
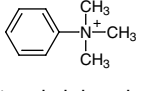
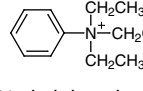
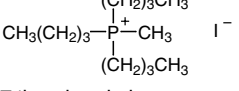
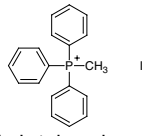
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| <p>N1156 1g 5g</p> <p><chem>CH3C(CH3)2CH2NH2 · HBr</chem></p> <p>Neopentylamine Hydrobromide CAS RN: 2710685-35-9</p> | <p>H1678 1g 5g</p> <p><chem>CH3(CH2)5NH2 · HBr</chem></p> <p>Hexylamine Hydrobromide CAS RN: 7334-95-4</p> | <p>O0442 1g 5g</p> <p><chem>CH3(CH2)7NH2 · HBr</chem></p> <p><i>n</i>-Octylamine Hydrobromide CAS RN: 14846-47-0</p> | <p>T3783 1g 5g</p> <p><chem>CH3C(CH3)2CH2C(CH3)2NH2 · HBr</chem></p> <p><i>tert</i>-Octylamine Hydrobromide CAS RN: 1093859-61-0</p> |
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| <p>B5185 1g 5g</p> <p><chem>Nc1ccccc1 · HBr</chem></p> <p>Benzylamine Hydrobromide CAS RN: 37488-40-7</p> | <p>F1227 1g 5g</p> <p><chem>Nc1ccc(F)cc1 · HBr</chem></p> <p>4-Fluorobenzylamine Hydrobromide CAS RN: 2270172-94-4</p> | <p>T3837 1g 5g</p> <p><chem>Nc1ccc(C(F)(F)F)cc1 · HBr</chem></p> <p>4-(Trifluoromethyl)-benzylamine Hydrobromide</p> | <p>P2388 1g 5g</p> <p><chem>NCCc1ccccc1 · HBr</chem></p> <p>2-Phenylethylamine Hydrobromide CAS RN: 53916-94-2</p> |
| <p>M3239 1g 5g</p> <p><chem>NCCc1ccc(OC)cc1 · HBr</chem></p> <p>2-(4-Methoxyphenyl)-ethylamine Hydrobromide CAS RN: 2705331-53-7</p> | <p>P2484 1g 5g</p> <p><chem>C1CCNC1 · HBr</chem></p> <p>Pyrrolidine Hydrobromide CAS RN: 55810-80-5</p> | <p>P2487 1g 5g</p> <p><chem>C1CCNCC1 · HBr</chem></p> <p>Piperidine Hydrobromide CAS RN: 14066-85-4</p> | <p>M3285 5g 25g</p> <p><chem>C1CNCCO1 · HBr</chem></p> <p>Morpholine Hydrobromide CAS RN: 6377-82-8</p> |
| <p>D4667 1g 5g</p> <p><chem>CCN(CC) · HBr</chem></p> <p>Diethylamine Hydrobromide CAS RN: 6274-12-0</p> | <p>D5853 5g</p> <p><chem>CCN(CC)CC · HBr</chem></p> <p>Dipropylamine Hydrobromide CAS RN: 7334-96-5</p> | <p>D5768 5g</p> <p><chem>CC(C)N(C)C · HBr</chem></p> <p>Diisopropylamine Hydrobromide CAS RN: 30321-74-5</p> | <p>D5857 5g</p> <p><chem>CCN(CC)CC · HBr</chem></p> <p>Dibutylamine Hydrobromide CAS RN: 10435-44-6</p> |
| <p>D5090 1g 5g</p> <p><chem>NCCCN · 2HBr</chem></p> <p>1,3-Diaminopropane Dihydrobromide CAS RN: 18773-03-0</p> | <p>D5685 1g 5g</p> <p><chem>NCCCCN · 2HBr</chem></p> <p>1,4-Diaminobutane Dihydrobromide CAS RN: 18773-04-1</p> | <p>D5615 1g 5g</p> <p><chem>CCN(C)CCN · 2HBr</chem></p> <p><i>N,N</i>-Dimethylethylenediamine Dihydrobromide CAS RN: 1245570-04-0</p> | <p>D5618 1g 5g</p> <p><chem>CCN(C)CCN · 2HBr</chem></p> <p>3-(Dimethylamino)-propylamine Dihydrobromide CAS RN: 2710685-13-3</p> |
| <p>P2490 1g 5g</p> <p><chem>C1CCNCC1 · 2HBr</chem></p> <p>Piperazine Dihydrobromide CAS RN: 59813-05-7</p> | | | |

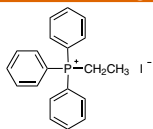
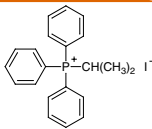
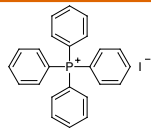
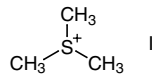
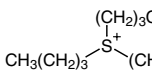
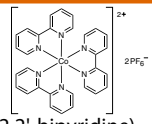
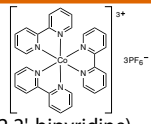
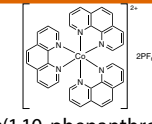
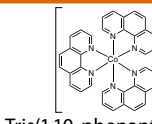
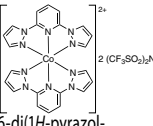
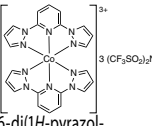
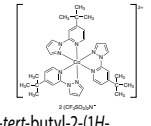
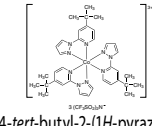
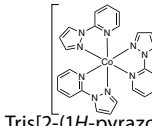
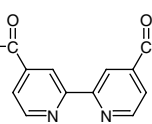
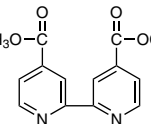
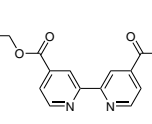
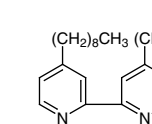
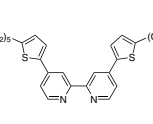
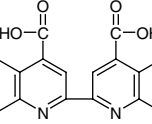
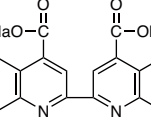
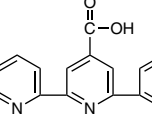
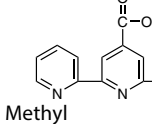
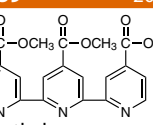
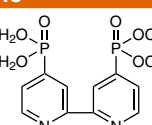
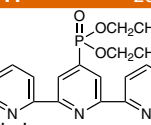
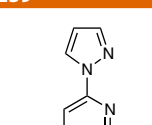
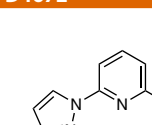
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| <p>I1006 1g 5g</p>  <p>Imidazole Hydrobromide (Low water content) CAS RN: 101023-55-6</p> | <p>A3091 1g 5g</p>  <p>5-Azoniaspiro[4.4]nonane Bromide CAS RN: 16450-38-7</p> | <p>A3094 1g 5g</p>  <p>5-Aminovaleric Acid Hydrobromide (Low water content) CAS RN: 2173111-73-2</p> | <p>塩化物塩</p> | | <p>M0138 25g 500g</p> <p>CH₃NH₂ · HCl</p> <p>Methylamine Hydrochloride CAS RN: 593-51-1</p> |
| <p>E0205 25g 500g</p>  <p>Ethylamine Hydrochloride CAS RN: 557-66-4</p> | <p>F1250 1g 5g</p>  <p>2-Fluoroethylamine Hydrochloride CAS RN: 460-08-2</p> | <p>P0522 25g</p>  <p>Propylamine Hydrochloride CAS RN: 556-53-6</p> | <p>I0166 25g 100g 500g</p>  <p>Isopropylamine Hydrochloride CAS RN: 15572-56-2</p> | <p>B0710 25g 500g</p>  <p>Butylamine Hydrochloride CAS RN: 3858-78-4</p> | |
| <p>I0096 25g 500g</p>  <p>Isobutylamine Hydrochloride CAS RN: 5041-09-8</p> | <p>I0083 1g 5g</p>  <p>Isopentylamine Hydrochloride CAS RN: 541-23-1</p> | <p>P2736 1g 5g</p>  <p>Pentylamine Hydrochloride CAS RN: 142-65-4</p> | <p>O0484 1g 5g</p>  <p><i>n</i>-Octylamine Hydrochloride CAS RN: 142-95-0</p> | <p>T3784 1g 5g</p>  <p><i>tert</i>-Octylamine Hydrochloride CAS RN: 58618-91-0</p> | |
| <p>F1271 5g 25g</p>  <p>4-Fluoroaniline Hydrochloride CAS RN: 2146-07-8</p> | <p>T3833 1g 5g</p>  <p>4-(Trifluoromethyl)aniline Hydrochloride CAS RN: 90774-69-9</p> | <p>B0407 25g 100g 500g</p>  <p>Benzylamine Hydrochloride CAS RN: 3287-99-8</p> | <p>F1255 1g 5g</p>  <p>4-Fluorobenzylamine Hydrochloride CAS RN: 659-41-6</p> | <p>T3836 1g 5g</p>  <p>4-(Trifluoromethyl)benzylamine Hydrochloride CAS RN: 3047-99-2</p> | |
| <p>P0086 25g 100g 500g</p>  <p>2-Phenylethylamine Hydrochloride CAS RN: 156-28-5</p> | <p>F1256 1g 5g</p>  <p>4-Fluorophenethylamine Hydrochloride CAS RN: 459-19-8</p> | <p>P2488 1g 5g</p>  <p>Piperidine Hydrochloride (Low water content) CAS RN: 6091-44-7</p> | <p>M3284 5g 25g</p>  <p>Morpholine Hydrochloride CAS RN: 10024-89-2</p> | <p>D0468 25g 500g</p>  <p>Diethylamine Hydrochloride CAS RN: 660-68-4</p> | |
| <p>D5856 5g</p>  <p>Dibutylamine Hydrochloride CAS RN: 6287-40-7</p> | <p>D5253 1g 5g</p>  <p>1,3-Diaminopropane Dihydrochloride (Low water content) CAS RN: 10517-44-9</p> | <p>D5617 1g 5g</p>  <p><i>N,N</i>-Dimethyl-1,3-propanediamine Dihydrochloride CAS RN: 52198-63-7</p> | <p>D5860 5g</p>  <p><i>N,N</i>-Diethylethylenediamine Dihydrochloride CAS RN: 52198-62-6</p> | <p>D5861 5g</p>  <p>3-(Dimethylamino)propylamine Dihydrochloride CAS RN: 99310-71-1</p> | |
| <p>A3393 5g</p>  <p>2-(1-Pyrrolidinyl)ethanamine Dihydrochloride CAS RN: 65592-36-1</p> | <p>P2491 1g 5g</p>  <p>Piperazine Dihydrochloride CAS RN: 142-64-3</p> | <p>D5251 1g 5g</p>  <p>1,4-Diazabicyclo[2.2.2]octane Dihydrochloride CAS RN: 49563-87-3</p> | <p>F0103 5g 25g</p>  <p>Formamidinium Hydrochloride CAS RN: 6313-33-3</p> | <p>A0008 25g 500g</p>  <p>Acetamidinium Hydrochloride CAS RN: 124-42-5</p> | |

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| <p>G0162 25g 500g</p>  <p>Guanidine Hydrochloride CAS RN: 50-01-1</p> | <p>A3092 1g 5g</p>  <p>5-Azoniaspiro[4.4]nonane Chloride CAS RN: 98997-63-8</p> | <p>A0436 1g 5g</p>  <p>5-Aminovaleric Acid Hydrochloride (Low water content) CAS RN: 627-95-2</p> | <p>擬ハロゲン化物塩</p> | <p>M2991 1g 5g</p> <p>CH₃NH₂ · HSCN</p> <p>Methylamine Thiocyanate CAS RN: 61540-63-4</p> |
| <p>F1153 1g 5g</p>  <p>Formamidine Thiocyanate CAS RN: 1821033-48-0</p> | <p>G0230 25g 500g</p>  <p>Guanidine Thiocyanate CAS RN: 593-84-0</p> | <p>F1152 1g 5g</p>  <p>Formamidinium Tetrafluoroborate CAS RN: 2607106-18-1</p> | <p>M2990 1g 5g</p> <p>CH₃NH₃⁺ BF₄⁻</p> <p>Methylammonium Tetrafluoroborate CAS RN: 42539-74-2</p> | <p>M2989 1g 5g</p> <p>CH₃NH₃⁺ PF₆⁻</p> <p>Methylammonium Hexafluorophosphate CAS RN: 28302-50-3</p> |
| <p>M3134 1g 5g</p> <p>CH₃NH₂ · HOCN</p> <p>Methylamine Cyanate CAS RN: 63405-91-4</p> | <p>T0914 25g 100g 500g</p>  <p>Tetrabutylammonium Tetrafluoroborate (Br < 0.02 %) CAS RN: 429-42-5</p> | <p>T2648 25g</p>  <p>Tetrabutylammonium Tetrafluoroborate (Br < 0.02 %) CAS RN: 429-42-5</p> | <p>キャリア 輸送材料</p> | <p>C3663 500mg</p>  <p>2PACz CAS RN: 20999-38-6</p> |
| <p>D5798 500mg</p>  <p>MeO-2PACz CAS RN: 2377770-18-6</p> | <p>M3477 500mg</p>  <p>Me-2PACz CAS RN: 2996161-30-7</p> | <p>F1374 500mg</p>  <p>F-2PACz</p> | <p>C3914 500mg</p>  <p>Cl-2PACz</p> | <p>B6391 500mg</p>  <p>Br-2PACz CAS RN: 2762888-11-7</p> |
| <p>I1255 500mg</p>  <p>I-2PACz CAS RN: 3026275-69-1</p> | <p>P2995 500mg</p>  <p>4PACz CAS RN: 20999-36-4</p> | <p>M3359 500mg</p>  <p>Me-4PACz CAS RN: 2747959-96-0</p> | <p>M3549 500mg</p>  <p>MeO-4PACz CAS RN: 2922526-56-3</p> | <p>B6445 500mg</p>  <p>Br-4PACz CAS RN: 2996161-28-3</p> |
| <p>D6300 500mg</p>  <p>4PADCB CAS RN: 2882156-63-8</p> | <p>P3172 500mg</p>  <p>3PATAT-C3</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 CAS RN: 2411528-61-3</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> |

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| <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>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>T3634 1g</p>  <p>Spiro-TAD CAS RN: 189363-47-1</p> |
| <p>T3704 200mg</p>  <p>Spiro-TTB CAS RN: 515834-67-0</p> | <p>T3672 1g 5g</p>  <p>Spiro-MeOTAD CAS RN: 207739-72-8</p> | <p>P3179 250mg 1g</p>  <p>PTAA CAS RN: 1333317-99-9</p> | <p>P2513 100mg 500mg</p>  <p>P3HT (regioregular) CAS RN: 110134-47-9</p> | <p>P3307 500mg</p>  <p>PANDI Isopropyl Alcohol Adduct</p> |
| <p>T0561 100mg 1g</p>  <p>Rubrene CAS RN: 517-51-1</p> | <p>T2233 250mg 1g</p>  <p>Rubrene (purified by sublimation) CAS RN: 517-51-1</p> | <div style="background-color: #f4a460; padding: 10px; text-align: center;"> <p>有機薄膜 太陽電池(OPV)材料</p> </div> | | |
| <div style="background-color: #f4a460; padding: 10px; text-align: center;"> <p>アクセプター 材料</p> </div> | | | | |
| <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>P2013 100mg</p>  <p>PCBB CAS RN: 571177-66-7</p> | <p>P2014 100mg</p>  <p>PCBO CAS RN: 571177-68-9</p> | <p>P2015 100mg</p>  <p>[60]PCB-C₁₂ CAS RN: 571177-69-0</p> |

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| <p>I0900 50mg</p>  <p>ICBA CAS RN: 1207461-57-1</p> | <p>B4576 50mg</p>  <p>Bis-PCBM (mixture of isomers) CAS RN: 1048679-01-1</p> | <p>C2415 100mg</p>  <p>C₆₀MC₁₂ CAS RN: 403483-19-2</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>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>P0972 25g 100g 500g</p>  <p>Pigment Red 224 CAS RN: 128-69-8</p> |
| <p>P2102 1g</p>  <p>Pigment Red 224 (purified by sublimation) CAS RN: 128-69-8</p> | <p>P0984 25g</p>  <p>3,4,9,10-Perylene- tetracarboxylic Diimide CAS RN: 81-33-4</p> | <p>D4429 1g 5g</p>  <p>Pigment Red 179 CAS RN: 5521-31-3</p> | <p>D4175 1g</p>  <p>PTCDI-C₈ CAS RN: 78151-58-3</p> | <p>P3289 1g</p>  <p>PDINN CAS RN: 1020180-01-1</p> |
| <p>B2892 1g 5g</p>  <p>Pigment Red 190 CAS RN: 6424-77-7</p> | <p>B4231 1g 5g</p>  <p>Pigment Red 149 CAS RN: 4948-15-6</p> | <p>B4268 1g 5g</p>  <p>Perylene Orange CAS RN: 82953-57-9</p> | <p>H1194 100mg 1g</p>  <p>F₁₆CuPc (purified by sublimation) CAS RN: 14916-87-1</p> | <p style="text-align: center; font-size: 2em; font-weight: bold;">ドナー材料</p> |
| <p>N0001 100mg 1g 5g</p>  <p>Naphthacene CAS RN: 92-24-0</p> | <p>N0951 200mg 1g</p>  <p>Naphthacene (purified by sublimation) CAS RN: 92-24-0</p> | <p>P0030 100mg 1g</p>  <p>Pentacene (purified by sublimation) CAS RN: 135-48-8</p> | <p>P2524 100mg 1g</p>  <p>Pentacene (99.999%, trace metals basis) (purified by sublimation) CAS RN: 135-48-8</p> | <p>D6033 250mg</p>  <p>DBP CAS RN: 175606-05-0</p> |
| <p>Q0078 100mg</p>  <p>α-Quaterthiophene CAS RN: 5632-29-1</p> | <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> |

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| <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</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>B6296 1g</p>  <p>Boron Subphthalocyanine Chloride (purified by sublimation) CAS RN: 36530-06-0</p> | |
| <p>P2513 100mg 500mg</p>  <p>P3HT (regioregular) CAS RN: 110134-47-9</p> | <p>P2710 100mg</p>  <p>PBTPD CAS RN: 1240372-42-2</p> | <p style="text-align: center;">色素増感 太陽電池(DSSC)材料</p> | | |
| <p>B3514 100mg</p>  <p>N719 Dye CAS RN: 207347-46-4</p> | <p>B4372 200mg</p>  <p>N3 Dye CAS RN: 141460-19-7</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>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 style="text-align: center;">電解質</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> | | | | <p>T0097 25g 100g 500g</p>  <p>Tetraethylammonium iodide CAS RN: 68-05-3</p> |
| <p>E0191 25g</p>  <p>Ethyltripropylammonium iodide CAS RN: 15066-80-5</p> | <p>T0172 25g 100g</p>  <p>Tetrapropylammonium iodide CAS RN: 631-40-3</p> | <p>T0057 25g 100g 500g</p>  <p>Tetrabutylammonium iodide CAS RN: 311-28-4</p> | <p>T1011 5g 25g</p>  <p>Tetraamylammonium iodide CAS RN: 2498-20-6</p> | <p>T1010 5g 25g</p>  <p>Tetrahexylammonium iodide CAS RN: 2138-24-1</p> |
| <p>T1396 25g</p>  <p>Tetraheptylammonium iodide CAS RN: 3535-83-9</p> | <p>P0246 25g</p>  <p>Trimethylphenylammonium iodide CAS RN: 98-04-4</p> | <p>P0242 5g 25g</p>  <p>Triethylphenylammonium iodide CAS RN: 1010-19-1</p> | <p>M1455 5g 25g</p>  <p>Tributylmethylphosphonium iodide CAS RN: 1702-42-7</p> | <p>M0253 25g 100g 500g</p>  <p>Methyltriphenylphosphonium iodide CAS RN: 2065-66-9</p> |

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| <p>E0549 25g 250g</p>  <p>Ethyltriphenylphosphonium iodide CAS RN: 4736-60-1</p> | <p>I0552 5g 25g</p>  <p>Isopropyltriphenylphosphonium iodide CAS RN: 24470-78-8</p> | <p>T1450 10g</p>  <p>Tetraphenylphosphonium iodide CAS RN: 2065-67-0</p> | <p>T1056 25g 500g</p>  <p>Trimethylsulfonium iodide CAS RN: 2181-42-2</p> | <p>T1564 1g</p>  <p>Tributylsulfonium iodide CAS RN: 18146-62-8</p> |
| <p>ホール輸送材料 コバルトドーパント</p> | | | | |
| <p>T3255 1g 5g</p>  <p>Tris(2,2'-bipyridine)cobalt(II) Bis(hexafluorophosphate) CAS RN: 79151-78-3</p> | <p>T3256 200mg 1g</p>  <p>Tris(2,2'-bipyridine)cobalt(III) Tris(hexafluorophosphate) CAS RN: 28277-53-4</p> | <p>T3553 1g 5g</p>  <p>Tris(1,10-phenanthroline)cobalt(II) Bis(hexafluorophosphate) CAS RN: 31876-74-1</p> | <p>T3554 1g 5g</p>  <p>Tris(1,10-phenanthroline)cobalt(III) Tris(hexafluorophosphate) CAS RN: 28277-59-0</p> | |
| <p>B5040 1g 5g</p>  <p>Bis[2,6-di(1H-pyrazol-1-yl)pyridine]cobalt(II) Bis(trifluoromethanesulfonyl)imide CAS RN: 1447938-66-0</p> | <p>B5041 200mg 1g</p>  <p>Bis[2,6-di(1H-pyrazol-1-yl)pyridine]cobalt(III) Tris(trifluoromethanesulfonyl)imide CAS RN: 1447938-63-7</p> | <p>T3363 1g 5g</p>  <p>Tris[4-tert-butyl-2-(1H-pyrazol-1-yl)pyridine]cobalt(II) Bis(trifluoromethanesulfonyl)imide CAS RN: 1447938-65-9</p> | <p>T3364 1g</p>  <p>Tris[4-tert-butyl-2-(1H-pyrazol-1-yl)pyridine]cobalt(III) Tris(trifluoromethanesulfonyl)imide CAS RN: 1447938-61-5</p> | <p>T3361 1g 5g</p>  <p>Tris[2-(1H-pyrazol-1-yl)pyridine]cobalt(II) Bis(hexafluorophosphate) CAS RN: 1392221-69-0</p> |
| <p>配位子</p> | | | | |
| <p>B1876 100mg 1g</p>  <p>2,2'-Biisonicotinic Acid CAS RN: 6813-38-3</p> | <p>D4635 1g 5g</p>  <p>Dimethyl 2,2'-Bipyridine-4,4'-dicarboxylate CAS RN: 71071-46-0</p> | <p>B6406 200mg 1g</p>  <p>Diethyl 2,2'-Diisonicotinate CAS RN: 1762-42-1</p> | <p>D3917 1g 5g</p>  <p>4,4'-Dinonyl-2,2'-bipyridyl CAS RN: 142646-58-0</p> | |
| <p>B4420 200mg</p>  <p>4,4'-Bis(5-hexyl-2-thienyl)-2,2'-bipyridyl CAS RN: 1047684-56-9</p> | <p>B3509 1g 5g</p>  <p>2,2'-Bicinchoninic Acid CAS RN: 1245-13-2</p> | <p>B4509 1g 5g</p>  <p>Bicinchoninic Acid Disodium Salt CAS RN: 979-88-4</p> | <p>T3245 200mg 1g</p>  <p>2,2':6',2''-Terpyridine-4'-carboxylic Acid CAS RN: 148332-36-9</p> | <p>M2464 100mg</p>  <p>Methyl 2,2':6',2''-Terpyridine-4'-carboxylate CAS RN: 247058-06-6</p> |
| <p>T2959 200mg</p>  <p>Trimethyl 2,2':6',2''-Terpyridine-4,4',4''-tricarboxylate CAS RN: 330680-46-1</p> | <p>B6518 1g 5g</p>  <p>BPDP CAS RN: 174397-53-6</p> | <p>D4511 200mg</p>  <p>Diethyl 2,2':6',2''-Terpyridine-4'-phosphonate CAS RN: 161583-75-1</p> | <p>P2239 1g 5g</p>  <p>2-(1-Pyrazolyl)pyridine CAS RN: 25700-11-2</p> | <p>D4672 1g 5g</p>  <p>2,6-Di(1-pyrazolyl)pyridine CAS RN: 123640-38-0</p> |

東京化成工業株式会社

試薬製品について

- 本社営業部 〒103-0001 東京都中央区日本橋小伝馬町 16-12 T-PLUS 日本橋小伝馬町8階
Tel: 03-3668-0489 Fax: 03-3668-0520 E-mail: Sales-JP@TCIchemicals.com
- 大阪営業部 〒541-0041 大阪府大阪市中央区北浜1-1-21 第2中井ビル1階
Tel: 06-6228-1155 Fax: 06-6228-1158 E-mail: osaka-s@TCIchemicals.com

スケールアップ、受託サービス(合成・開発・製造)について

- 化成品営業部 〒103-0001 東京都中央区日本橋小伝馬町 16-12 T-PLUS 日本橋小伝馬町8階
Tel: 03-5651-5171 Fax: 03-5640-8021 E-mail: finechemicals@TCIchemicals.com

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