Biopds™
Renewable. Ambient Compostable. FCN Approved
PTT MCC Biochem (PTTMCC) is a strategic joint venture between PTT Public Company Limited (PTT) and Mitsubishi Chemical Corporation (MCC) with the intention to focusing solely on the bio-chemical industry and creating products of benefit to mankind and to build a greener world. Consequently, PTTMCC is determined to produce bio-chemical products that will initiate changes for a better future. We have launched our first project with the Polybutylene Succinate (PBS) Plant in Thailand, which is also the first bio-based PBS plant in the world, and scheduled to commercialize by 2016.

However, the BioPBS™ project is only our first step. PTTMCC will continue to develop and create new bio-chemical products that will help to save the world for the future. Our aim is to become a leading Bio-Driver in order to create a greener world.

BioPBS™ (bio-based polybutylene succinate) is revolutionary in its two-fold bio properties. It is both bio-based and biodegradable plastic, using advanced technology from Mitsubishi Chemical Corporation. Derived from natural resources, such as sugarcane, cassava and corn, BioPBS™ decomposes into biomass, carbon dioxide and water in ambient condition (30 °C).

Products made from BioPBS™ can be disposed of along with organic waste. It is compostable at open-air landfill site in ambient condition (30°C), without requiring a specialized composting facility. So, BioPBS™ is the truly environmentally-friendly plastic for green products.
BioPBS™ Benefits?

1. Superior compostable in ambient condition (30 °C) without composting facility.

2. With BioPBS™, your products are conceived from nature and will return to nature at the end of life.

3. You can utilize this advance material with the same machines you currently owned with no additional investment.

Easy Implementation

Food Contact Approved

FZ grades are listed in U.S. FCN No.1574, comply with OM-6 in EU 10/2011 and JHOSPA. FD grade comply with OM-3 in EU10/2011.

High Service Temperature

Applications made by BioPBS™ can withstand up to 100°C. BioPBS™ can be used for hot beverage cups, boxes, and utensils for freshly cooked food.

Excellent Heat Sealability

Having the same level of seal strength as conventional petro-plastic, we provide the same performance with less cost in waste disposal expense.

Easy to Compound with Other Bioplastics

Compounding BioPBS™ with other types of biopolymer can enhance each other to a greater degree of mechanical and thermal properties.
Compostable plastic and Bio-based plastic

BioPBS™ is compostable & derived from renewable material

Compostable plastic can be made from either renewable or petroleum material, after used and end up in composting condition, it will be broken down into a natural elements such as H₂O, CO₂ and biomass. Compostable plastics are divided into two groups. Plastics that are compostable at ambient temperature such as BioPBS™ and plastics that are compostable in composting facility in which higher composting temperatures can be reached. While bio-based plastics are made from renewable material but not every bio-based plastic is compostable.

BioPBS™ is a combination of both bio-based plastic and compostable bioplastic. It can be composted at open-air landfill site in ambient condition (30 °C) without composting facility.

Whereas some bioplastics are compostable in composting facility, but not enough composting facility!

<table>
<thead>
<tr>
<th>Country</th>
<th>Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>almost 5,000</td>
</tr>
<tr>
<td>Germany</td>
<td>980</td>
</tr>
<tr>
<td>Canada</td>
<td>350</td>
</tr>
</tbody>
</table>

Despite there are almost 5,000 composting facilities in the USA, it's not enough for the world's most development country in which 3 billion populations are living in.
How to dispose of BioPBS™ products?

1. Drop
   Just simply drop into a regular trash can and let them go forward to the waste management system.

2. Ambient compost
   BioPBS™ can be composted in ambient condition (30°C) in soil at open-air landfill site.

3. Back to nature
   H₂O, CO₂ and biomass that are left in soil will be used as part of biocycle for the plant growth over again and again.

* BioPBS™ can be applied in current extrusion coating machines, blown film extruders, and injection molding machines.

BioPBS™ is available in various grades which meets the following international standard for compostability and bio-based content. Product made from BioPBS™ can be disposed of along with organic waste. Thus, BioPBS™ is the true environmentally-friendly plastics for green products.
BioPBS™-Paper coating

Easy Implementation

- Process is stable and low neck-in
- Can run as fast as LDPE in existing LDPE machine
- Easy penetration into pore and around fiber yielding excellent adhesion to cup stock paper
- Low heat seal temperature and excellent heat seal strength at lower coating thickness compared to typical bioplastic
- Excellent printability without pre-treatment
- Listed in U.S. FCN No. 1574, JHS/SPA and comply with EU10/2011
- Resistance to elution of vinegar, cooking oil, olive oil, etc.
- Resistance to percolation of cooking oil, worcester sauce, ketchup, etc.

Environmentally-friendly

- Compostable at room temperature can significantly reduce a landfill space.
- Slash waste management cost as it needs no special composting facilities.
- As high as 96% of BioPBS™-coated paper is reputable, certified by the well-known institute, Western Michigan University.
- It greatly impacts on lowering deforestation rate.
- No need to change consumer behavior. They just simply throw them out in regular trash cans and let waste management system work on their own.

Due to its outstanding processability in several facets, BioPBS™ can save your operational cost in comparison with other bioplastics. It partly reduces deforestation rate as a result of their superior recyclable property. Being friendly to the surrounding environment, BioPBS™-coated paper also helps reduce the amount of waste as it can be composted along with organic waste at ambient temperature (30 °C).
<table>
<thead>
<tr>
<th>Properties</th>
<th>Test Method</th>
<th>Unit</th>
<th>BioPBS™</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>FZ71 (PM/PB)</td>
</tr>
<tr>
<td>Density</td>
<td>ISO 1183</td>
<td>g/cm³</td>
<td>1.26</td>
</tr>
<tr>
<td>MFR [190 °C, 2.16 kg]</td>
<td>ISO 1133</td>
<td>g/10 min</td>
<td>22</td>
</tr>
<tr>
<td>Melting Point</td>
<td>ISO 3146</td>
<td>°C</td>
<td>115</td>
</tr>
<tr>
<td>Yield Stress</td>
<td>ISO 527-2</td>
<td>MPa</td>
<td>40</td>
</tr>
<tr>
<td>Stress at Break</td>
<td>ISO 527-2</td>
<td>MPa</td>
<td>30</td>
</tr>
<tr>
<td>Strain at Break</td>
<td>ISO 527-2</td>
<td>%</td>
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<tr>
<td>Flexural Modulus</td>
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<td>MPa</td>
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<tr>
<td>Flexural Strength</td>
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<td>MPa</td>
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<tr>
<td>Izod Impact Strength [23 °C]</td>
<td>ISO 180</td>
<td>kJ/m²</td>
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<tr>
<td>Heat Deflection Temperature [0.45 MPa]</td>
<td>ISO 75-2</td>
<td>°C</td>
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<td>Rockwell Hardness</td>
<td>ISO 2039-2</td>
<td>R Scale</td>
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*PM grades are intended to come into contact with food applications.*