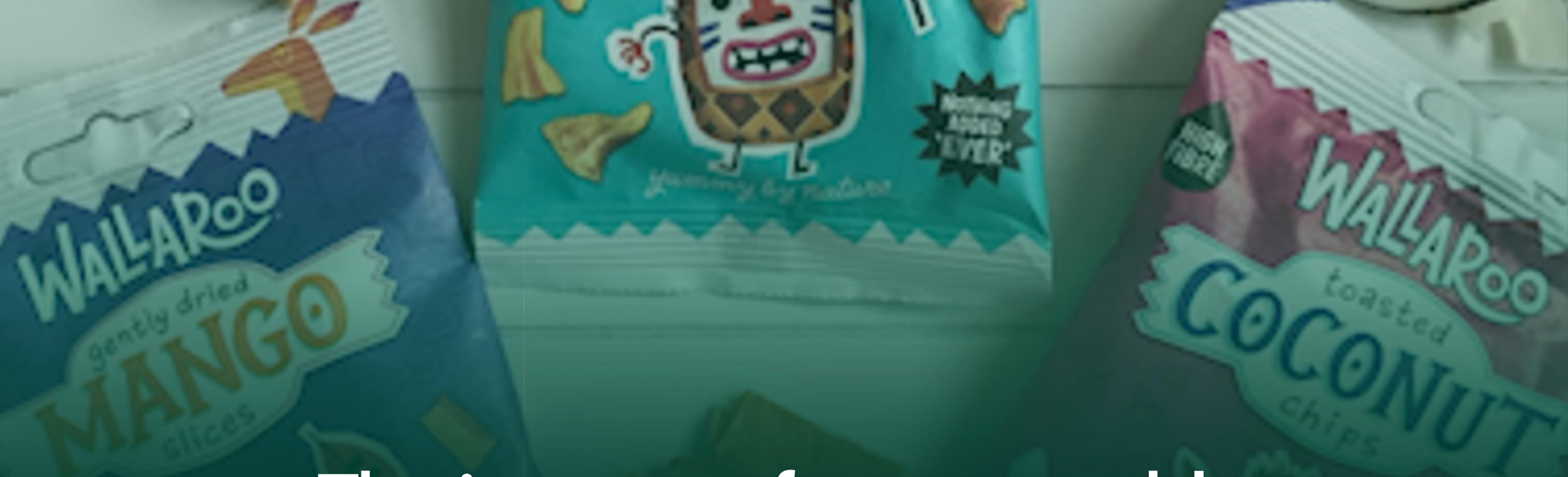


The journey of compostable packaging for consumer products supporting a circular economy.

parkside

ptt MCC Biochem

BIOPDS™
Renewable . Compostable . FCN Approved

Agenda

- Speakers' profiles
- Companies' introduction
- The greener sustainable options for flexible packaging:
  - Global trend including UK & EU of biobased and compostable solutions in flexible packaging.
  - Direction of home compostable solution in flexible packaging.
  - Parkside's sustainability strategy.
  - PTTMCC's sustainability strategy.
- PTTMCC sustainability for flexible packaging and home compostable grade.
- Parkside and PTTMCC partnership on developing flexible packaging.
- Success story of home compostable packaging.
  - Local case in the UK
- Call for action to test sample and collaborate in the development.
- Q&A?

Speakers' profiles

Mark Shaw

Technical manager
Parkside UK

Mark Shaw has worked in packaging for over 33 years and has been fundamental in the development and accreditation of Parkside's home compostable packaging utilising his experience in inks, adhesives and substrates. Mark is also involved in the development of paper recyclable, plastic recyclable, easy open and re-closable flexible packaging.

Pun

Marketing Analyst
PTT MCC Biochem Co., Ltd.

Pun has been in marketing field for several years and a part of bioplastics industry with PTTMCC for a period. He has a strong passion to establish a solid sustainable chain of bioplastics and elevate plastic packaging industry with BioPBS™. Currently, he has been in responsible for marketing part of PTTMCC globally.

Companies' introduction

parkside

Creating packaging for tomorrow... today

Presented by
Parkside Flexibles

parkside | ptt MCC Biochem | BIOPDS™ Renewable . Compostable . FCN Approved

Companies' introduction

We are Parkside, we are…

Globally Local

Offices around the world
UK, Austria, Singapore
and Malaysia

Insight Led

Driving relevancy
in innovation

Innovation & Technology

Bringing insight to life with our
innovation lab & market leading
technology

Companies' introduction

ASEAN's

ASEAN's leader for production and distribution of chemicals, olefins, PE, PS, green chemicals and bioplastics

NatureWorks
50%

ptt MCC Biochem

GC
50%

PATENTED BioPBS™ PATENTED

MITSUBISHI CHEMICAL
50%

#1

JAPAN'S LARGEST CHEMICAL COMPANY

THE KAITEKI COMPANY
Mitsubishi Chemical Holdings Group

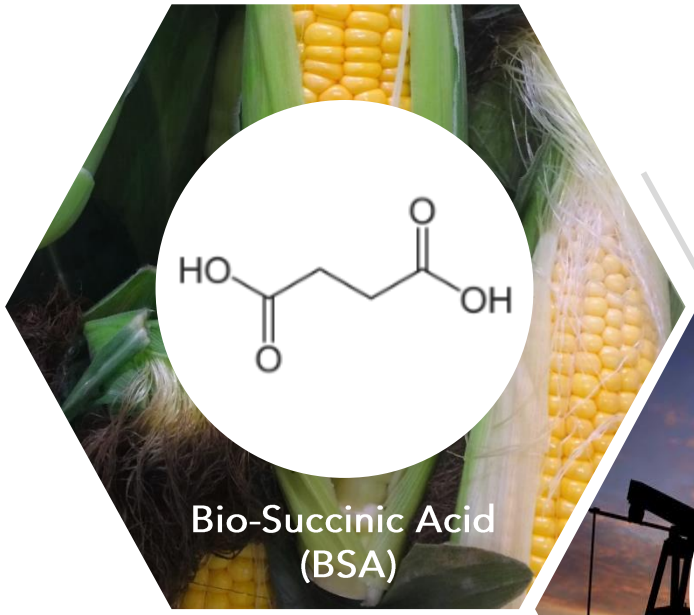
PTT MCC Biochem is a Joint Venture of PTTGC and MCC, two shareholders that met with ambitious program for developing innovative bioplastic : **BioPBS™**

parkside ptt MCC Biochem BioPBS™ Renewable . Compostable . FCN Approved

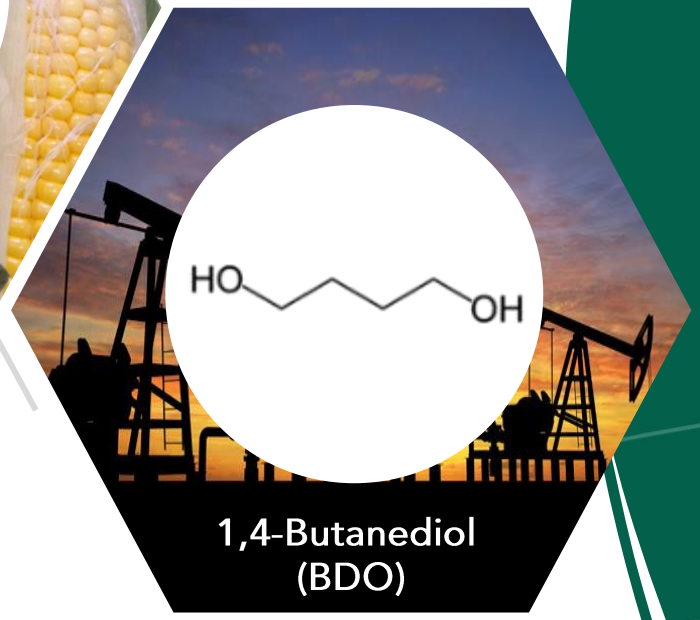
Companies' introduction

Partially Bio-based Polybutylene Succinate

Renewable Resource



Bio-Succinic Acid (BSA)



1,4-Butanediol (BDO)

BioPBS™

BioPBS™ is manufactured by PTT MCC Biochem Company Limited

The greener sustainable options for flexible packaging:

Global trend including UK & EU of biobased and compostable solutions in flexible packaging

Estimated Market Value of $1.9bn

+49% of on pack sustainability claims

Sizeable & Growing!

Highest Consumer Engagement

Data Sources: Innova Market Insights, It's a wrap: The future of packaging is all about sustainability & Digital Journal

The greener sustainable options for flexible packaging:

Direction of home compostable solution in flexible packaging

Closed Loop Recycling

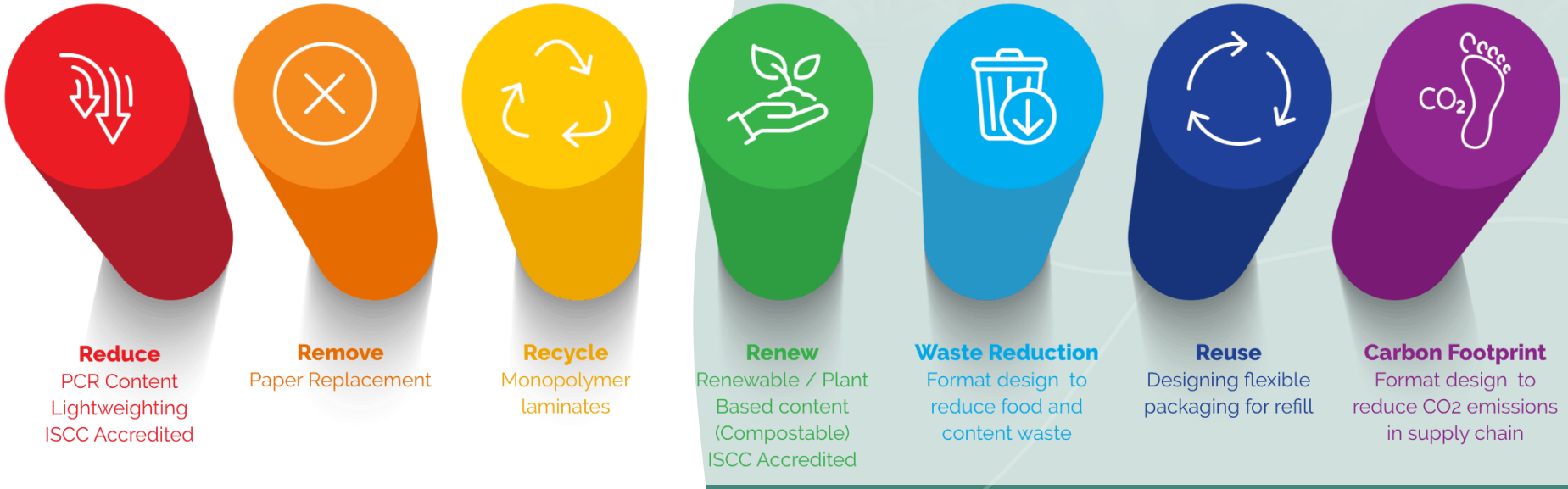
Food Service

Heavily Contaminated

Currently unable to Recycle

Parkside Sustainability Strategy

Our unique proposition:



Whatever your packaging sustainability challenge, Parkside has the solution

With compostable front & centre

PTTMCC's sustainability strategy

Total BioPBS solution : We provide a one-stop-service for customers through product / service solutions.

Flexible packaging

100% bio-based

BIOPBS™

Coffee capsules

Fiber & nonwoven

Paper coating

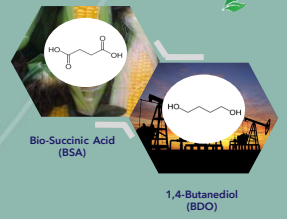
BIOPBS™

OK compost | TÜV AUSTRIA | INDUSTRIAL S0534

Product	Services	Solutions
• Home compostable • 100% Bio-PBS • Expand new applications	• Technical consult & advice services • Lab trials (if any) • Opportunity to develop new applications	• Business matching with converters / compounders / brands globally.

Product development

Renewable Resource



100% bio-based

BIOPBS™

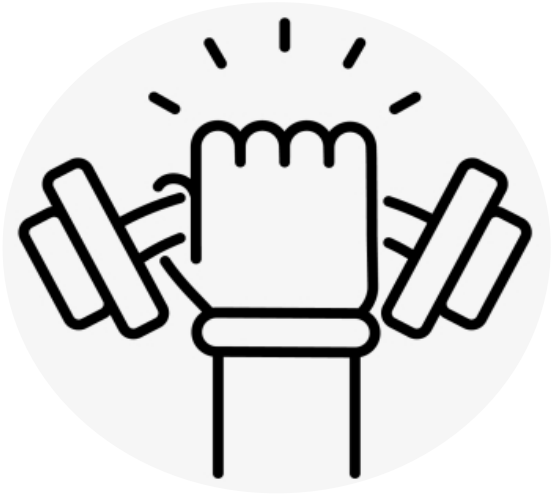
OK compost | TÜV AUSTRIA | HOME S0534

Strategic partnership

ptt MCC Biochem × parkside

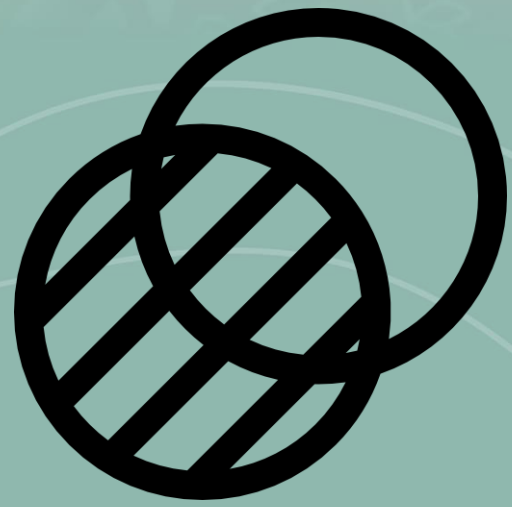
parkside | ptt MCC Biochem | BIOPBS™ Renewable . Compostable . FCN Approved

PTTMCC sustainability for flexible packaging and home compostable grade.



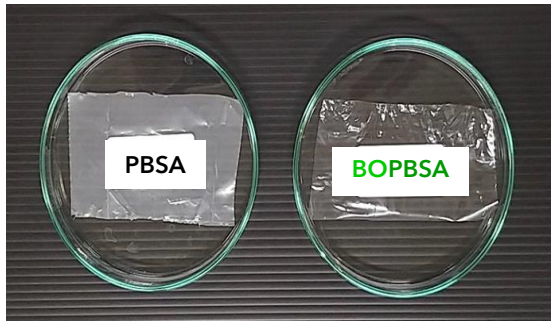
- Mechanical properties improvement

- As a sealant layer for packaging (FD92PM/PB)
  - Blown film
  - Cast sheet
- Certified home compostable at 502 microns



- Transparency improvement

PTTMCC sustainability for flexible packaging and home compostable grade.

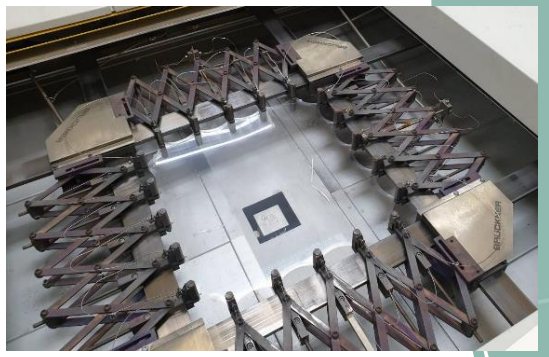


BioPBS film is currently produced by blown film extrusion process and used as a sealant film in flexible packaging. Although this process can provide good film, it cannot control very good thickness distribution and clarity. Moreover, the tear strength in transverse direction is too high for consumers to tear and open the packaging.

Current product		BOPBSA
BioPBS™ as a sealing film in flexible packaging		BOPBSA
Pain points		**Value propositions**
• Thickness distribution		• Increasing tensile strength
• Moderate barrier properties		• Improving impact strength
• Clarity (translucent)		• Enhancing clarity
Properties		
Density (g/cm^3)	1.24	1.24
Thickness (μm)	30	25
Transmittance (%)	84	91
Tensile Strength (MPa) MD TD	 27 27	 71 57
Elongation at Break (%) MD TD	 ≥ 475 ≥ 475	 220 240
Dart Drop (J)	0.5	1.2
Melting Temperature	85 °C (185 °F)	85 °C (185 °F)

To overcome these limitations

- ✓ **Biaxial orientation process** is commonly used to produce film for lamination process due to its good control on thickness uniformity and providing film clarity.
- ✓ MTS preliminarily tested BioPBS in lab-scale and found that it has potential to develop into commercial-scale.



BO-PBSA: 4.0x in MD and 4.0x in TD

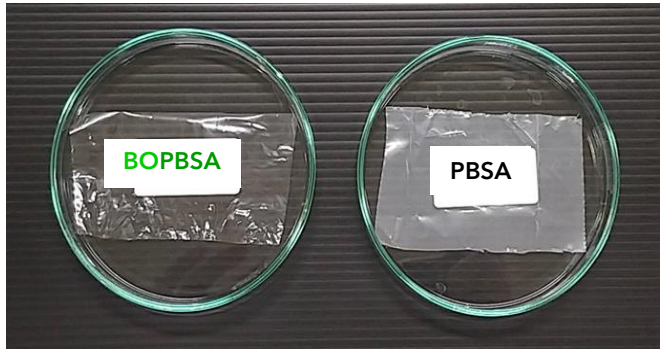
Simultaneous stretching

PTTMCC sustainability for flexible packaging and home compostable grade.

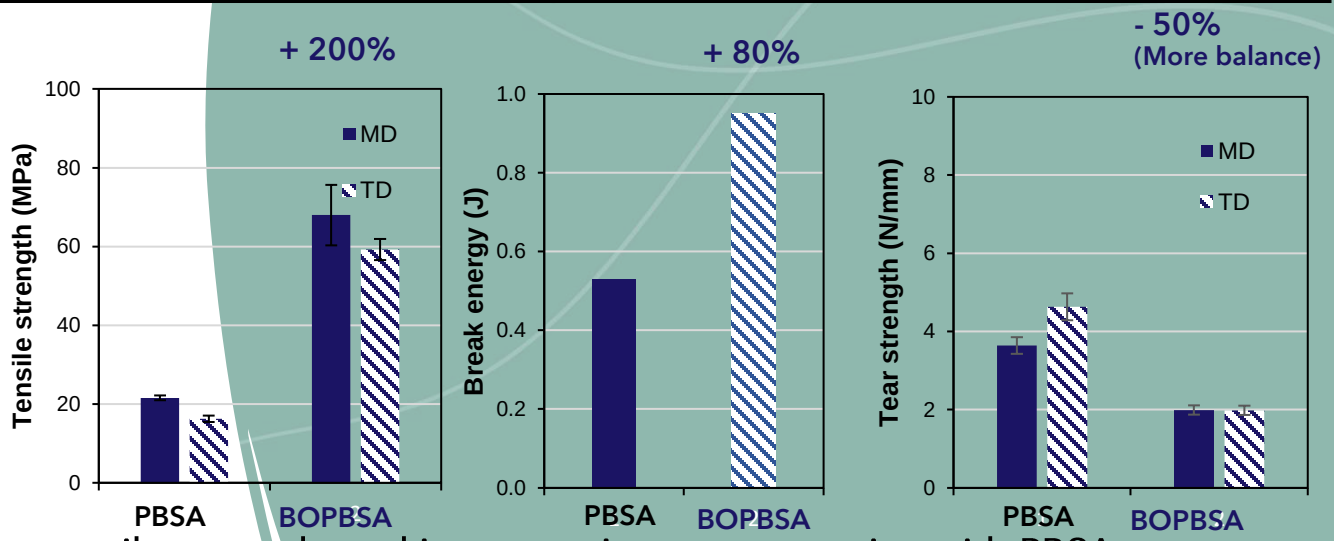
- **PBSA is able to run in simultaneous biaxial stretching process on lab-scale machine.**

Machine: BRUCKNER KARO IV (Lab scale)

Processing parameter	
Stretching ratio	3.5x – 5.5x (Industrial 5x – 6x)
Stretching speed	75 mm/s
Pre-heating temperature	75 – 78 °C
Pre-heating time	30 sec



Film appearance



BOPBSA presents a better clarity, tensile strength, and impact resistance comparing with PBSA.

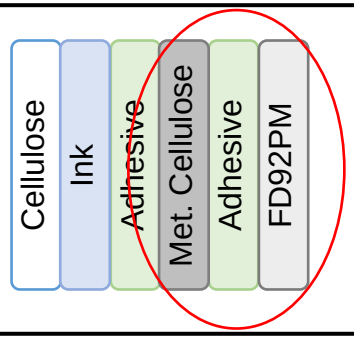
PTTMCC sustainability for flexible packaging and home compostable grade.

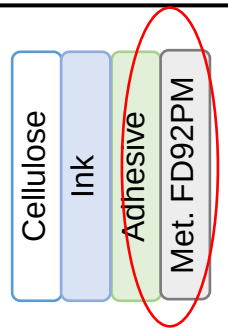
❑ Benefits of BO-PBSA

- ✓ Suitable for BO-PET machine setting
- ✓ Processing is friendly and easily set up.
- ✓ Do not require pinning MB for better sticking to chill roll.
- ✓ BO-PBSA film was highly transparent, flexible and soft without loudness.
- ✓ BO-PBSA film is heat sealable with strong seal strength at low temperature.
- ✓ Strong tear resistance in MD while yielding easy tear on TD which can provide easy tear open for food packaging.
- ✓ Can apply for heat shrink wrap application

PTTMCC sustainability for flexible packaging and home compostable grade.

❑ Metalised PBSA

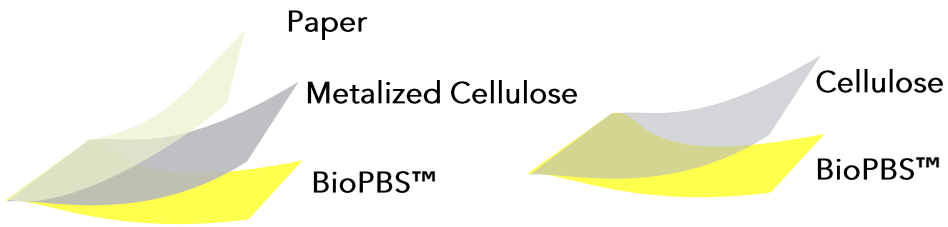
Current Structure
BioPBS™ as a sealing layer

Pain points
• Adhesion between FD92PM and metalizing is not excellent
• Cannot extrusion coating on metalizing surface
• Metalizing cellulose is high cost.

New developing structure
BioPBS™ as a sealing layer

Benefits
• No adhesion issue
• Less structure
• Cost should be better

	OTR (cc/m²/day/atm)		WVTR (g/m²/day)	
	Condition	Value	Condition	Value
19NK//20NKME//35PBSA	20°C, 50%RH	0.1	40°C, 90%RH	1.8
	20°C, 80%RH	0.2		
FD92PM 20µm	23°, 0%RH	2,045	38°C, 90%RH	1,048
FD92PM 50µm	23°, 0%RH	756	38°C, 90%RH	511
Met. FD92PM (FD92PM 50µm, Optical Density 2.0)	23°, 0%RH	5.8	38°C, 90%RH	2.2

Parkside and PTTMCC partnership on developing flexible packaging.

❑ BioPBS™ as a sealing layer



BioPBS | FD92PM Film Certified
Home Compostable by TUV
at 502 micron

Snack Pack

Short Shelf-life Package

Coffee & Tea

BioPBS™ Benefits

- ✓ Good processability
- ✓ Good sealability
- ✓ Transparency
- ✓ Bio-based & Home compostability
- ✓ Food contact certified
- ✓ Compatible with cellulose
- ✓ No smell & Low noise
- ✓ Customer Perception > Paper-like
- ✓ Organic Recycling > Contributing to Recycling Effort

Success story of home compostable packaging
Local case in the UK

The first crisp brand in the UK with home compostable packaging, it's **award winning** too!

The only crisps on sale at Glastonbury Festival 2022. The UK's biggest, most well known music festival

Contributing towards B-Corp status. Installed a commercial composter & providing customers with small scale composters

Fully compostable bag & valve. Bag is home compostable & valve is industrial

Collects packaging for reuse, recycling or composting, creating a closed-loop system.!

All fruit & veg comes in paper or home compostable packaging, where packaging is needed at all

Market Leading **Closed Loop** **Award Winning**

Contact us

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Q & A