BioPBS, new revolutionary bioplastic matrix for composites applications

15th International Symposium on Bioplastics, Biocomposites & Biorefining (ISBBB 2018)

Mr. Fabien Resweber
V.P. Sales & Marketing at PTTMCC



July 24-27, 2018
Ontario, Canada

ptt MCC Biochem | BIOPDS

Who is PTTMCC ?

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%

MITSUBISHI CHEMICAL
50%

BIOPBS™
Renewable . Compostable . FCN Approved



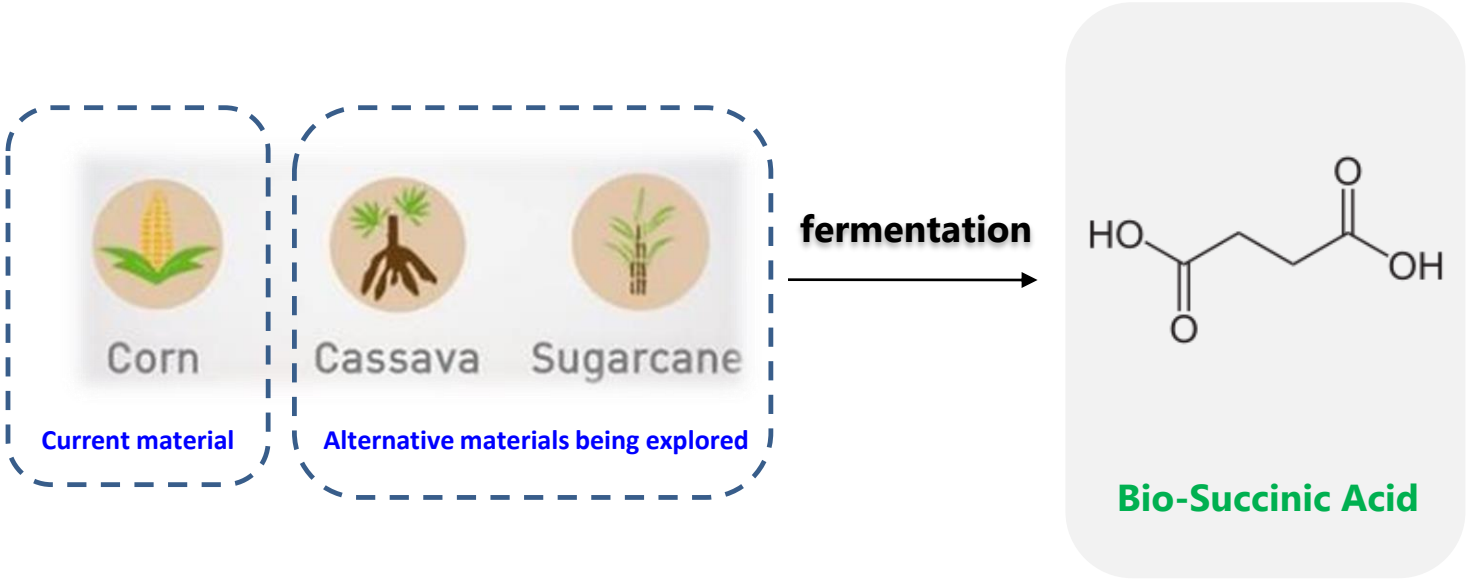
#1
JAPAN'S LARGEST CHEMICAL COMPANY

THE KAITEKI COMPANY
Mitsubishi Chemical Holdings Group

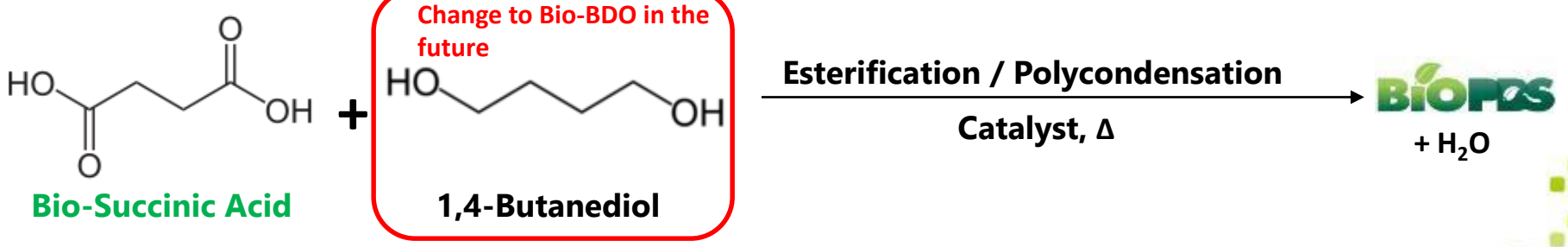
PTTMCC is a Joint Venture of **PTTGC** and **MCC**, two shareholders that met with ambitious program for developing innovative bioplastic : **BioPBS™**

What is BioPBS™?

PBS is produced from Succinic acid and 1,4-BDO.



BioPBS™ Chemical Reaction



Currently, BioPBS is partially biobased

Strong patented BioPBS™

Exclusive license

BIOPBS™

From MCC patents



20,000 ton annual capacity

Commercialize by 2017

Patent on biomass-based high quality polyesters

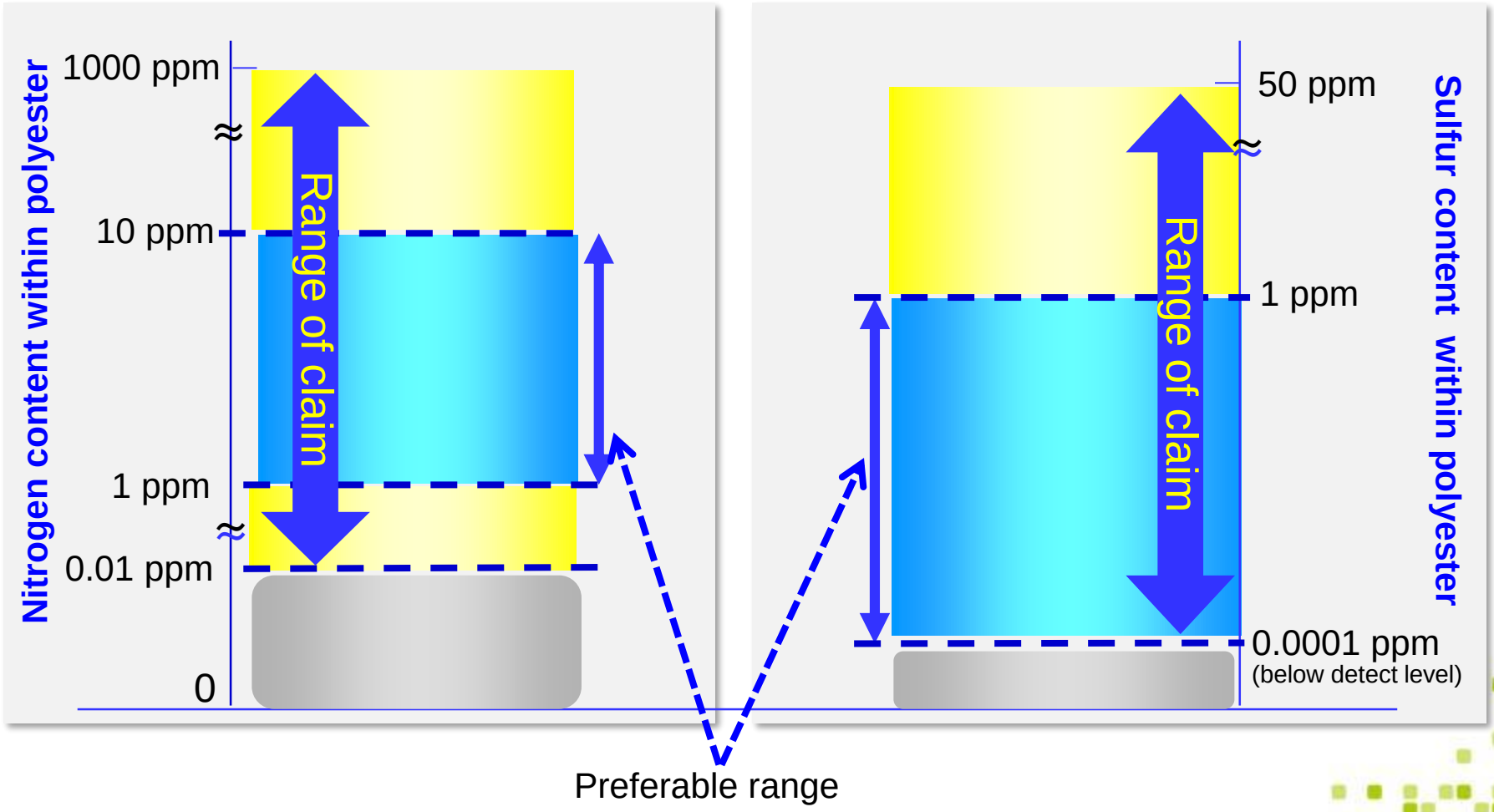
- Basic information in the EU
  - Title of the Invention : **BIOMASS-RESOURCE-DERIVED POLYESTER AND PRODUCTION PROCESS THEREOF**
  - Applicant : **Mitsubishi Chemical Corporation**
  - Inventor : AOSHIMA Takayuki (+8 people)
  - Publication info : EP 1882712 (B1)
  - Priority date : 22.04.2005

- Patent granted in Japan, EU, US, and China

MCC applied for this patent in 2005 (the initial stage of bioplastics industry).

Patent on biomass-based high quality polyesters

- Defines amount of substances (nitrogen and sulfur) essential for bio-polyesters usable for practical application
- Patent granted in Japan, EU, US, and China



BioPBS™: Dual level of Eco-friendliness

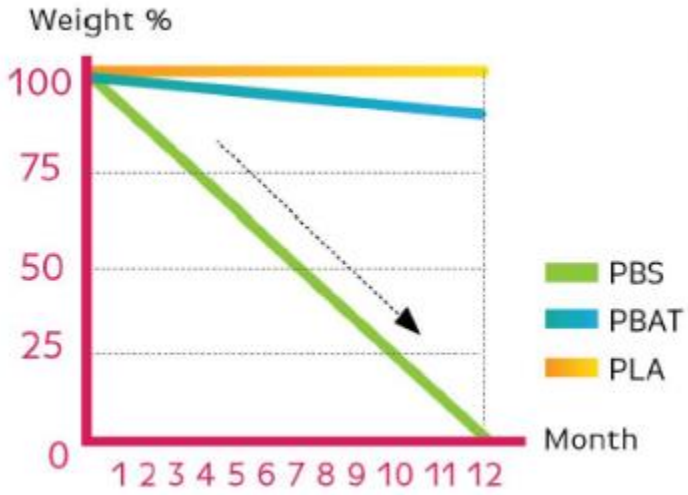
1

Renewable resources

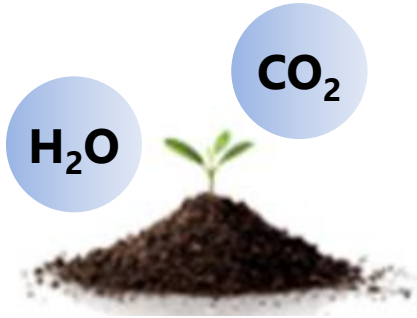


2

Biodegradability

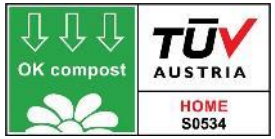


- Decomposes into H_2O and CO_2 with microorganism in soil
- No composting facility required
- Biodegrades at ambient temperature
- Biodegrades faster than other bioplastics



Biodegradable / Biobased certified







EU









USA









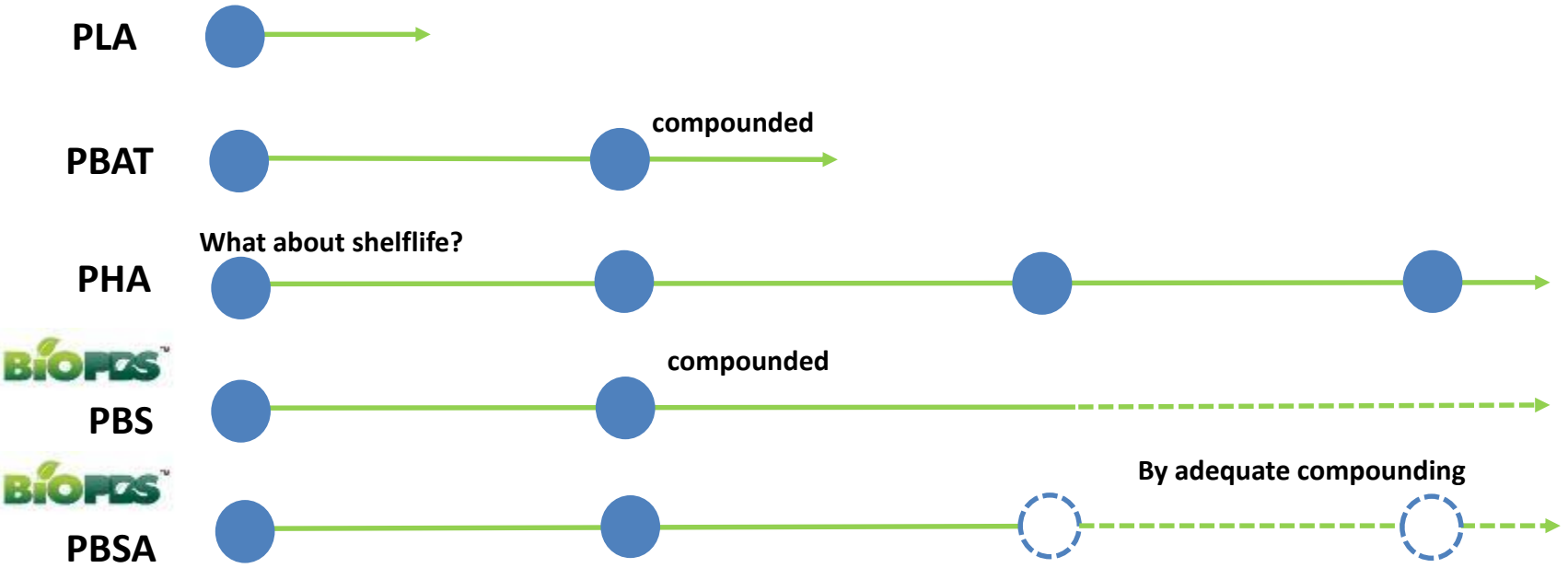
JP / AUS



No.299/No.300

BioPBS™ makes every compostable possible





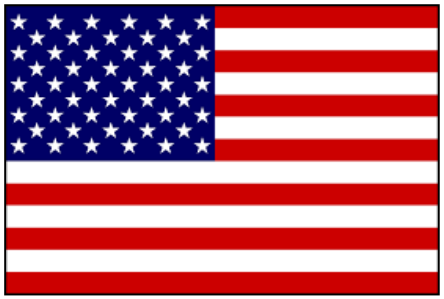
BIOPBS Versatile for Degradable and Durable items

FCN & others food contact certificates



Complies with EU directives 10/2011

- All raw materials on positive list
- FZ-Grade: Migration test passed OM-6 (100°C, 4 hours)
- FD-Grade: Migration test passed OM-2 (40°C, 10 days)



FCN

FZ-Grade: FCN# 1817

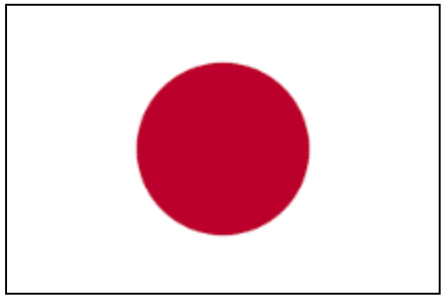
- Condition of Use B-H
- All food types except alcoholic foods

http://www.accessdata.fda.gov/scripts/fdcc/?set=FCN&id=1574

FD-Grade: FCN# 1818

- Condition of Use C-G
- All food types except alcoholic foods

http://www.accessdata.fda.gov/scripts/fdcc/?set=FCN&id=1574



JHOSPA

Listed in positive list



China Food Contact

FZ-Grades are Listed in positive list

Like no other,
BioPBS™ is the only PBS with FCN approved

BioPBS™
The Best Sealant layer for barrier packaging

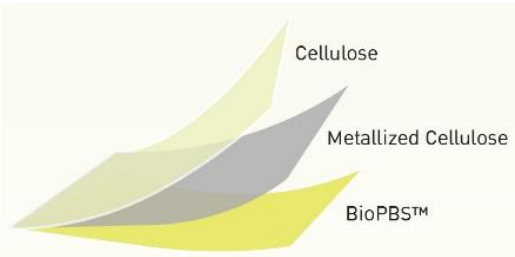
Renewable



Home Compostable

Excellent Sealability

Compatible with cellulose



BioPBS™
Perfect combination with PLA for injection Molding

Renewable



Compostable







Reduce cycle time with high service temperature

Impact modifier

Flexibility

BioPBS™
Compostable solution for synthetic fiber

Home Compostable

Renewable





Compatible with PLA and cellulose

Heat stability

Sealability

BioPBS™
The Best bioplastic for paper coating

Renewable



Compostable

Good adhesion to paper

Heat stability

Repulpable / Recyclable

Paper coating solutions

	LDPE	Bio-PE	PLA	BioPBS
Renewable Carbon		√	√	√
Compostability	X	X	√	√
Recyclability (pulp)	√	√	X	√
HDT	+++	+++	++	+++
Processability	+++	+++	+	+++

No.299/No.300

USDA CERTIFIED BIOBASED PRODUCT

COMPOSTABLE IN INDUSTRIAL FACILITIES

PTS No.488

recyclable certified at WMU

Open-up new possibility of BioPBS™ applications

Paper lamination



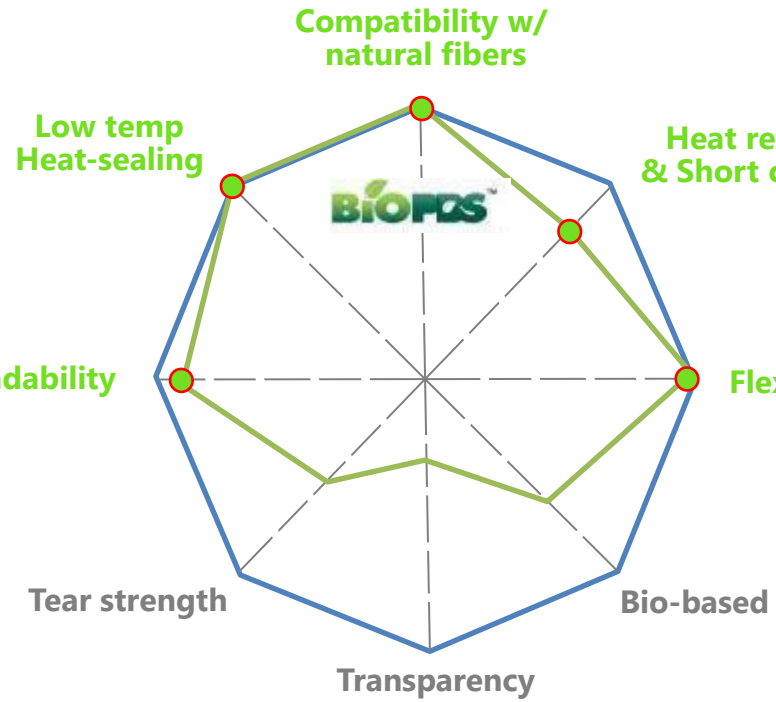


- Home compostable soon!
- Biobased
- Recyclable / Repulpable

Fiber







PLA Enhancer

- Reduce cycle time
- Heat resistant





Film / Barrier packaging





- Home compostable
- Biobased
- Good sealability

Commercialized worldwide



Almost **2,000** branches of Café Amazon nationwide



2013

The biggest cinema movie theater " Major Cineplex " with **BioPBS™** popcorn bucket



2014

European coffee brands



2016

US's franchise restaurant



Coffee brands in EU & US



Coffee pad



2017

Sugar pouch / Hotel amenity



Barrier packaging



Cutlery



Straw



Paper container



2018

ABM COMPOSITE
Arctic Biomaterials



Composite

BioPBS™

Recognized worldwide through Int'l Event

2017



AUDENCIA TRIATHLON, FRANCE
16-17 SEP, 2017

2018



NANTES MARATHON, FRANCE
21-22 APRIL, 2018



TRIATHLON CÔTE D'AMOUR FRANCE
10 JUNE 2018



AUDENCIA TRIATHLON, FRANCE
22-23 SEP, 2018

Sustainability & Innovation

Compostable at ambient temperature

CO_2

H_2O





Foldability

No Lids & No Straws

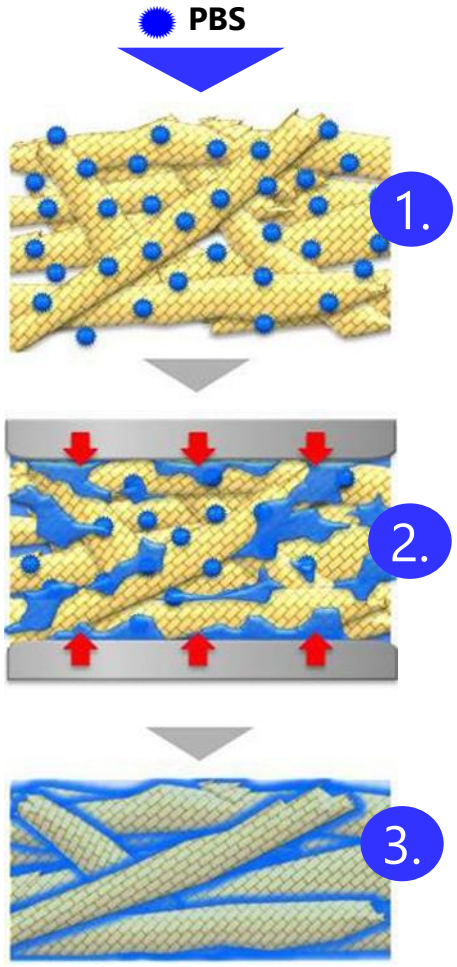


Reinforced composites

BioPBS™ composite – Natural Fiber

BioPBS™ has excellent
compatibility with natural fiber at lower processing temp
when compared to other polymer

	Solubility Parameter value $(cal/cm^3)^{1/2}$	Tm °C
Phenol resin	12	-
PBS	**11**	**115**
PLA	11	170
PET	12	250
PA6	14	150
PE	8	110
Lignin	12	-
Cellulose	10～12	-



1. Dispersion on the surface of natural fibers
2. Penetration into natural fibers and bridging of the gap at comparatively low temperature
3. Excellent compatibility with natural fibers

BioPBS™ composites for Consumer

Bioplastics for Houseware/Tableware



Antimicrobial Biodegradable Bowl

(PBS compound containing 20% Sandal wood powder)

Materials Designed by
Plastics Institute of Thailand
and
Srinakharinwirot University

Biodegradable Compact Powder

(PBS compound containing 10% rice starch)

Materials Designed by
Plastics Institute of Thailand



BioPBS™ composite for Consumer

Other Bioplastic products

สถาบันพลาสติก Plastics Institute of Thailand



Biodegradable Mobile Case

(PBSA base compound containing 20% Thermoplastic starch)

สถาบันพลาสติก Plastics Institute of Thailand

Materials Designed by
Plastics Institute of Thailand
and
Silpakorn University

Biodegradable Bath Kits Packaging

(PBSA compound containing 10% rice starch)

สถาบันพลาสติก Plastics Institute of Thailand

Materials Designed by
Plastics Institute of Thailand



BioPBS™ composite for Marine environment



Oyster collection cup : BioPBS + oyster shell powder

- Renewable carbon
- Recycled filler
- Biodegradability in marine environment in 10-15y (estimated) in case of leakage to marine environment







ABM COMPOSITE

Arctic Biomaterials

ABM COMPOSITE
Arctic Biomaterials

ptt MCC Biochem | BIOPOS

- Founded 2014
- 35 professional persons and over 200 years of biopolymer experience
- Manufacturing and R&D sites at Tampere, Finland
- New manufacturing site under construction in Asia

HQ



EU



CN





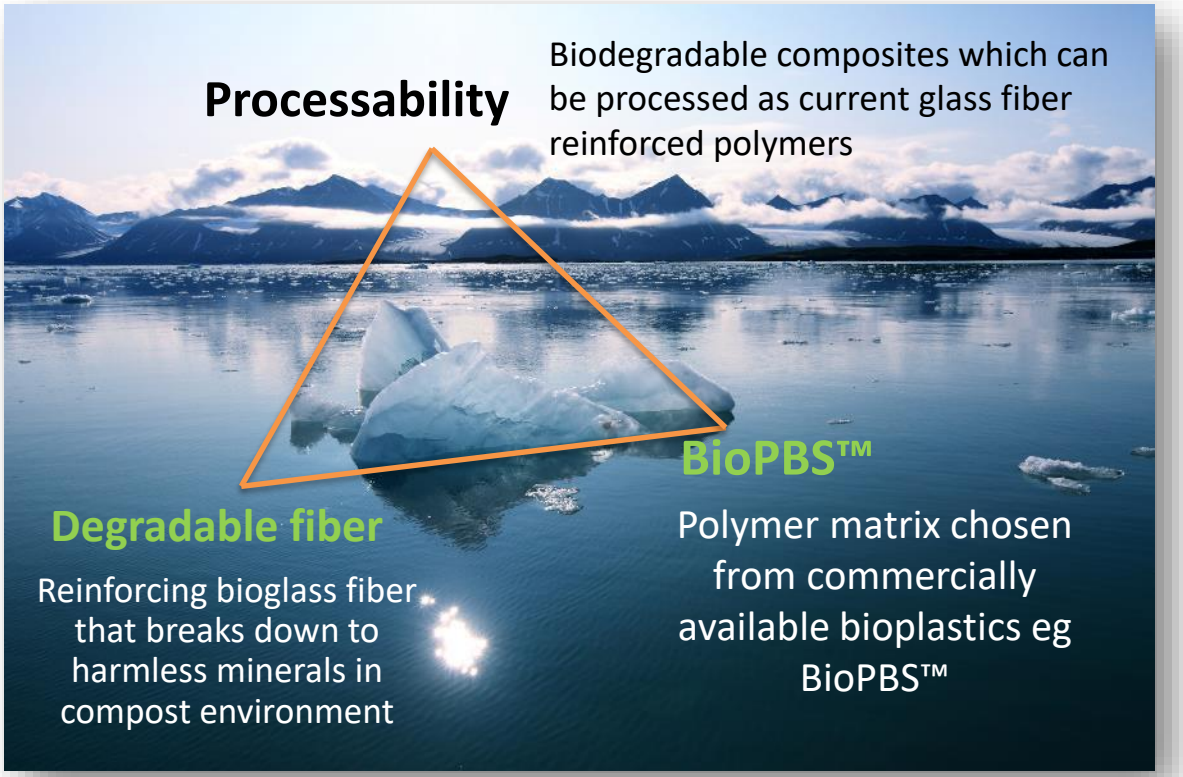


What is degradable (bio)glass fiber?

The bioresorbable glass fiber reinforced

BioPBS™

materials
produced with
ABMcomposite technology
to fulfill customer needs
in **injection** applications in
an **environmentally friendly way.**



ABM COMPOSITE
Arctic Biomaterials

Technology

Composite technology is based on properiatory bioglass fiber and thermoplastic pultrusion technology

Bioglass fibers are manufactured and compounded in-house to composite pellets (LFT)

Matrix polymer is bio-based and biodegradable

These grades can be processed with standard injection moulding machines and tools

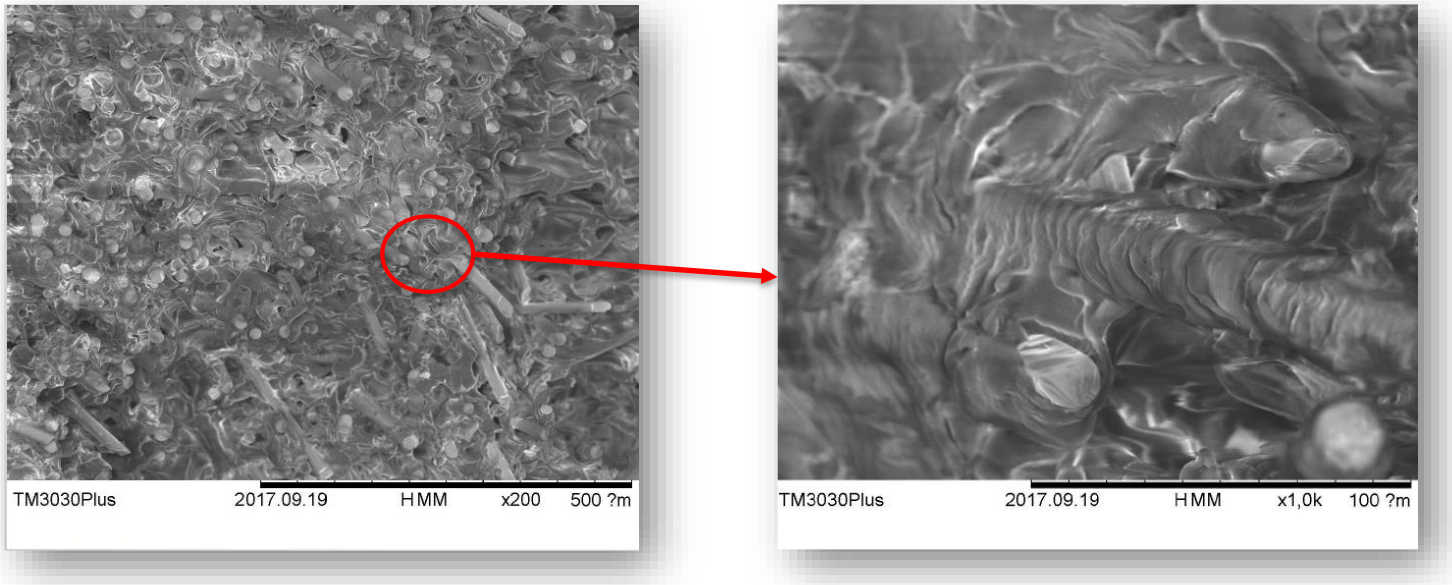




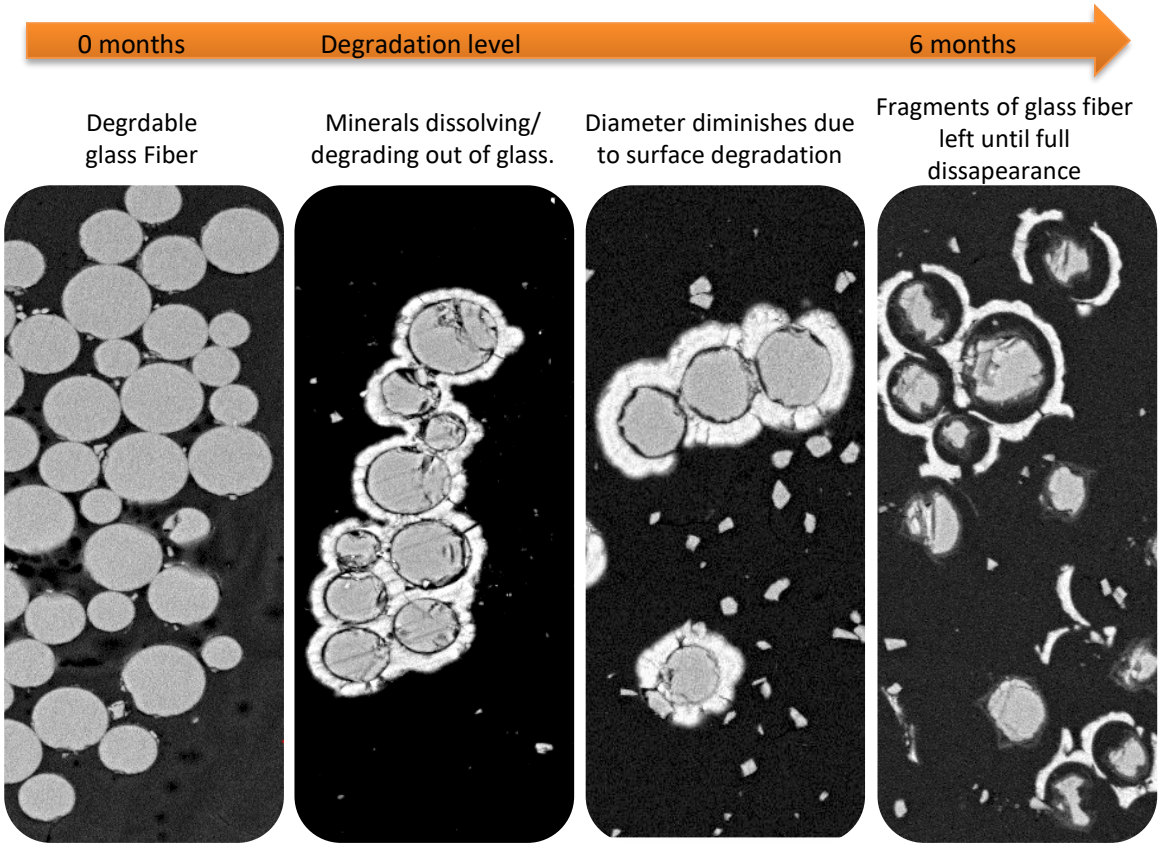
ABM Adhesion (Sizing) Technology

- The adhesion needs to be tailored for each polymer matrix to ensure good adhesion and mechanical properties

BioPBS



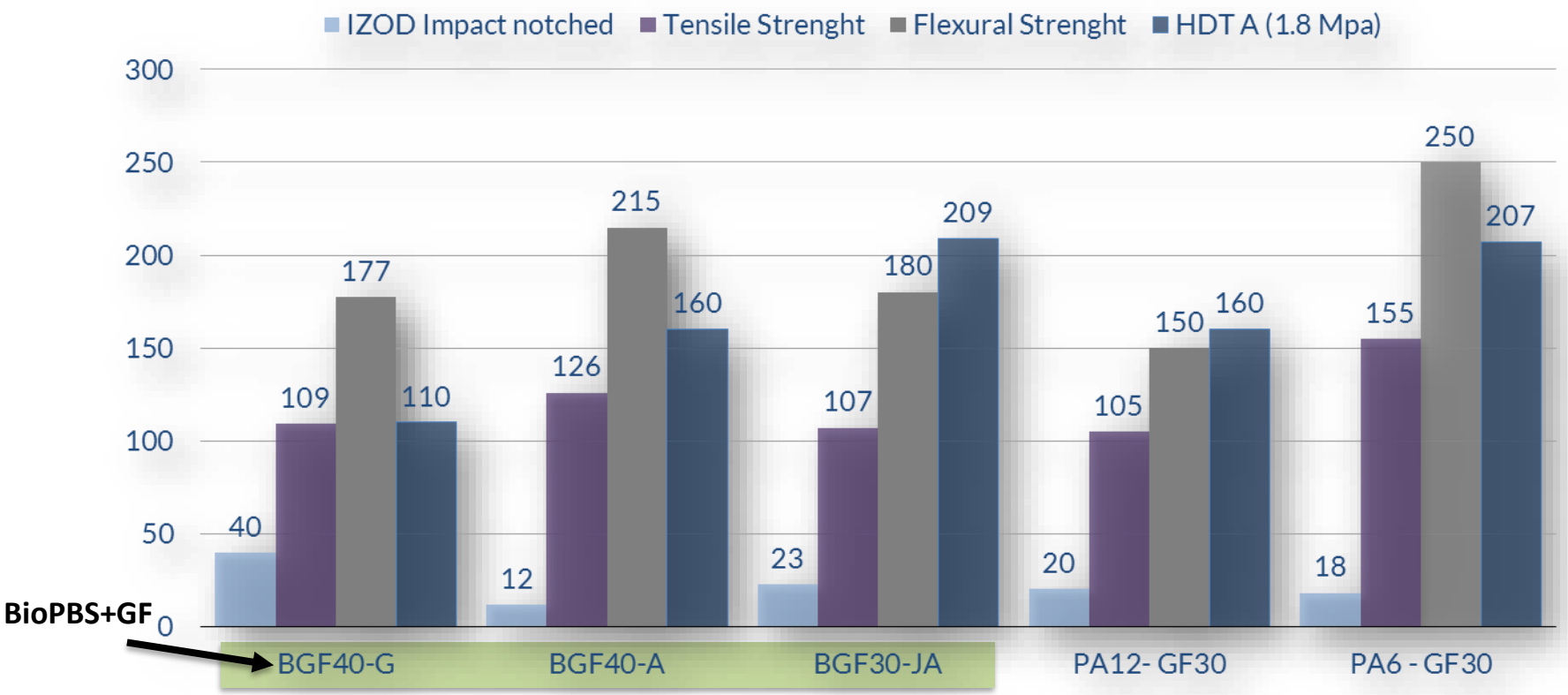
SEM-EDX Analysis of degradable Glass Fiber



compostable

ABM COMPOSITE
Arctic Biomaterials

Compatibility and reinforce properties through BioPBS™



ABM COMPOSITE
Arctic Biomaterials

ABM Technology

ABM brings value-added properties to Bio-based and/or Biodegradable polymers

- Mechanical properties (Impact/Tensile/Flexural)
  - **Impact comparable with PC or PC-ABS or Flexural with PA-GF**
- Temperature resistance
  - **With PLA up to 160 ºC and PBS 110 ºC (HDT A)**
- Industrially or home compostable but **Durable products**
  - TUV certified with seedling mark
- Antimicrobial properties
  - **99,99 % effectivity based on glass technology**
- Antistatic Properties
  - **90% Bio-based antistatic additives**
- Flame Retardancy
  - **Halogen free UL94 V-0 (1.2 – 2.0 mm)**





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