Bioplastics-

Engineered for Rigid Applications

Kelly Lehrmann
FKuR Plastics Corporation
Cedar Park, Texas

FKuR at a glance

- Privately owned company
- Started in 1992 as a research institute
- Founded in 2003 as bioplastics spin-off
- USA based FKuR Plastic Corporation founded in 2009
- Material research and development in cooperation with the Fraunhofer Institute UMSICHT, Oberhausen/Germany

- Brand names:
  - ➔ Bio-Flex®: PLA blends for extrusion and injection moulding
  - ➔ Biograde®: CA blends for injection moulding and thermoforming
  - ➔ Fibrolon®: Wood Plastics Compounds (WPC) for injection moulding
  - ➔ Terralene™: Bio-PE Compounds based on Braskem‘s „Green PE“

FKuR at a glance

Worldwide Support:

Sustainability – Our Mission!

Sustainability

„Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.“

(World Commission of Environment and Development, 1987)

Increasing ecological consciousness of consumers & companies

Raw Bioplastics

Request for sustainable products

Need for Bioplastics

Biodegradable Plastics (either fossil or renewable carbon source)		**Biobased Plastics** (only renewable carbon source)	
Biodegradable:	„Biological process of organic matter being degraded by micro-organisms (fungi, bacteria) and ultimately converted to water, CO_2/methane, energy and new cell biomass.“	**Renewable:**	„Referring to the feedstock's, being renewed in two growing seasons or less (e.g. sugar, corn, wheat, grass, bacteria).”
Typical Applications:	Packaging, Agriculture, Gardening (Healthcare)	**Typical Applications**:	Packaging (Automotive, Consumer Electro.)

Alternative Waste Disposal Route

Reduce CO_2 Emissions

Biodegradable Plastics
(either fossil or renewable carbon source)

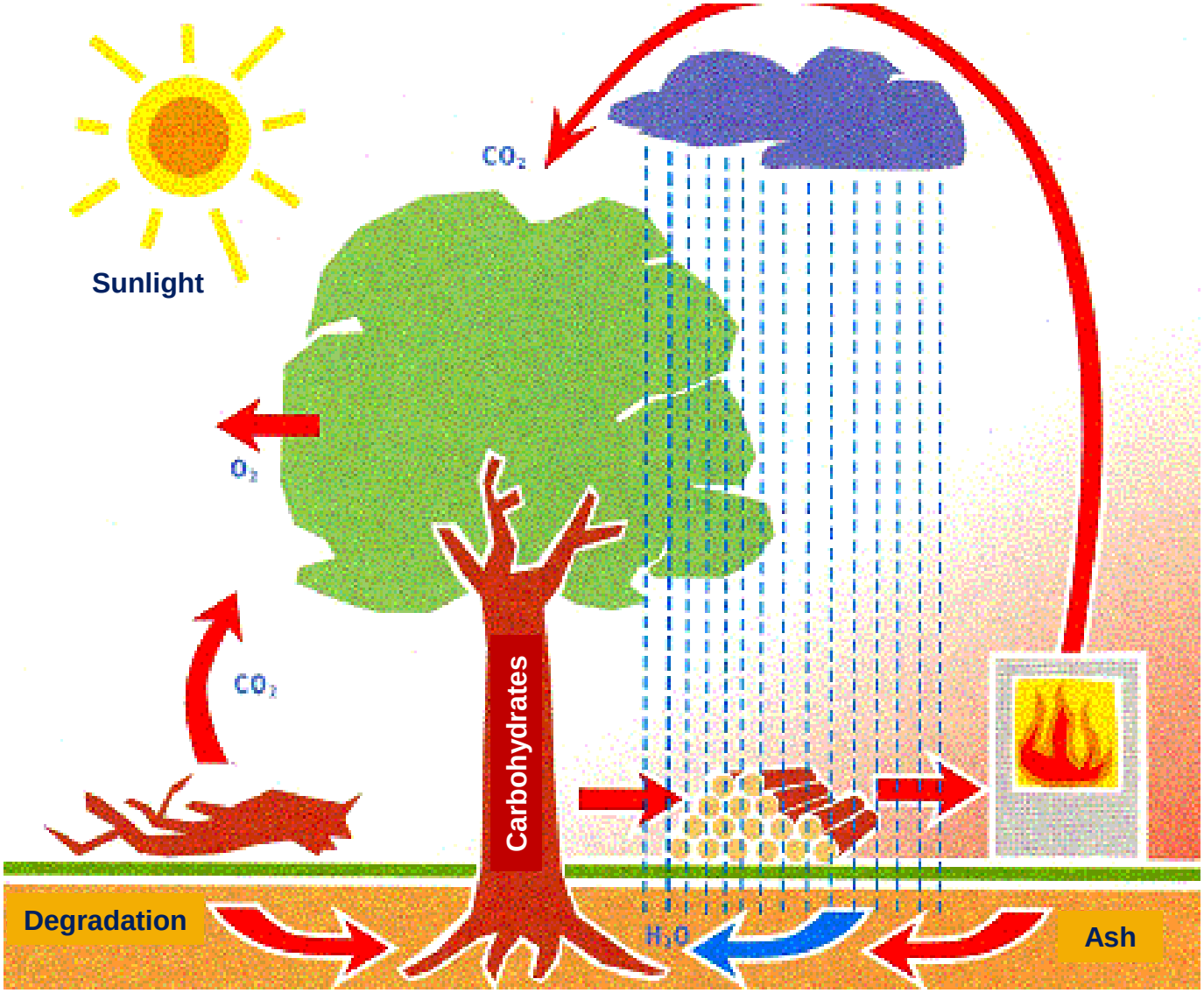
"Compostable": Certified biodegradable material – being converted to compost, e.g. in industrial composting facilities – in a defined time frame.

Requirements of ASTM D6400 (EN 13432)

- chemical characterisation (organic share > 50 %; thresholds for hazardous substances)
- biodegradability tests (laboratory scale: max. 5 % non degradable/1 % per substance; rest degrades to CO_2, H_2O, salts and biomass)
- compostability tests (field test: 90 % of fragments < 2 mm after 12 weeks)
- eco-toxicity tests (seedling rate of plants > 90 % of untreated seedling rate)

Biobased Plastics

Renewable carbon sources: closed loops



Plant growth stores CO_2 in form of carbohydrates:

"CO_2 sink"

Digestion of plant returns same amount of CO_2 as plant has stored:

"CO_2 neutral"

Even burning of plant returns same amount of CO_2 as plant has stored:

"CO_2 neutral"

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Need for Bioplastics

PLA | PHA | PBAT | PBS | Starch | CA | Bio-PE | Bio-PA

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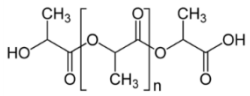

- Bio-based
- Biodegradable

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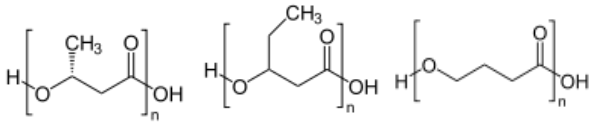
P3HB | PHV | P4HB



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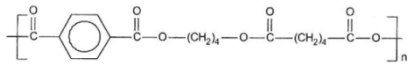

- Fossil-based
- Biodegradable

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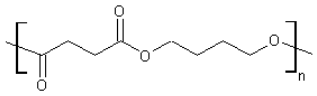

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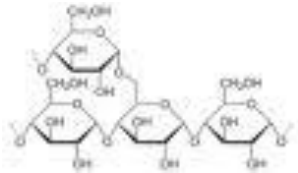

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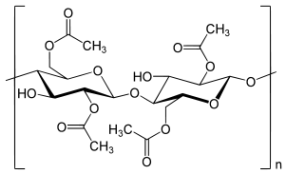

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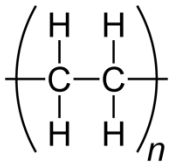

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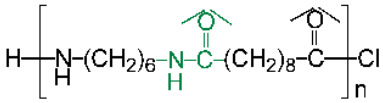

- Bio-based
- Not Biodegradable

Raw Bioplastics

Which Bioplastics meet my product's requirements best?

PLA	PHA	PBAT	PBS	Starch	CA	Bio-PE	Bio-PA

Price

- Bioplastics generate added values!

Performance

- Mech. requirements often not fulfilled!

Processing

- Difficult to process with existing machines!

Compounding is the Key!

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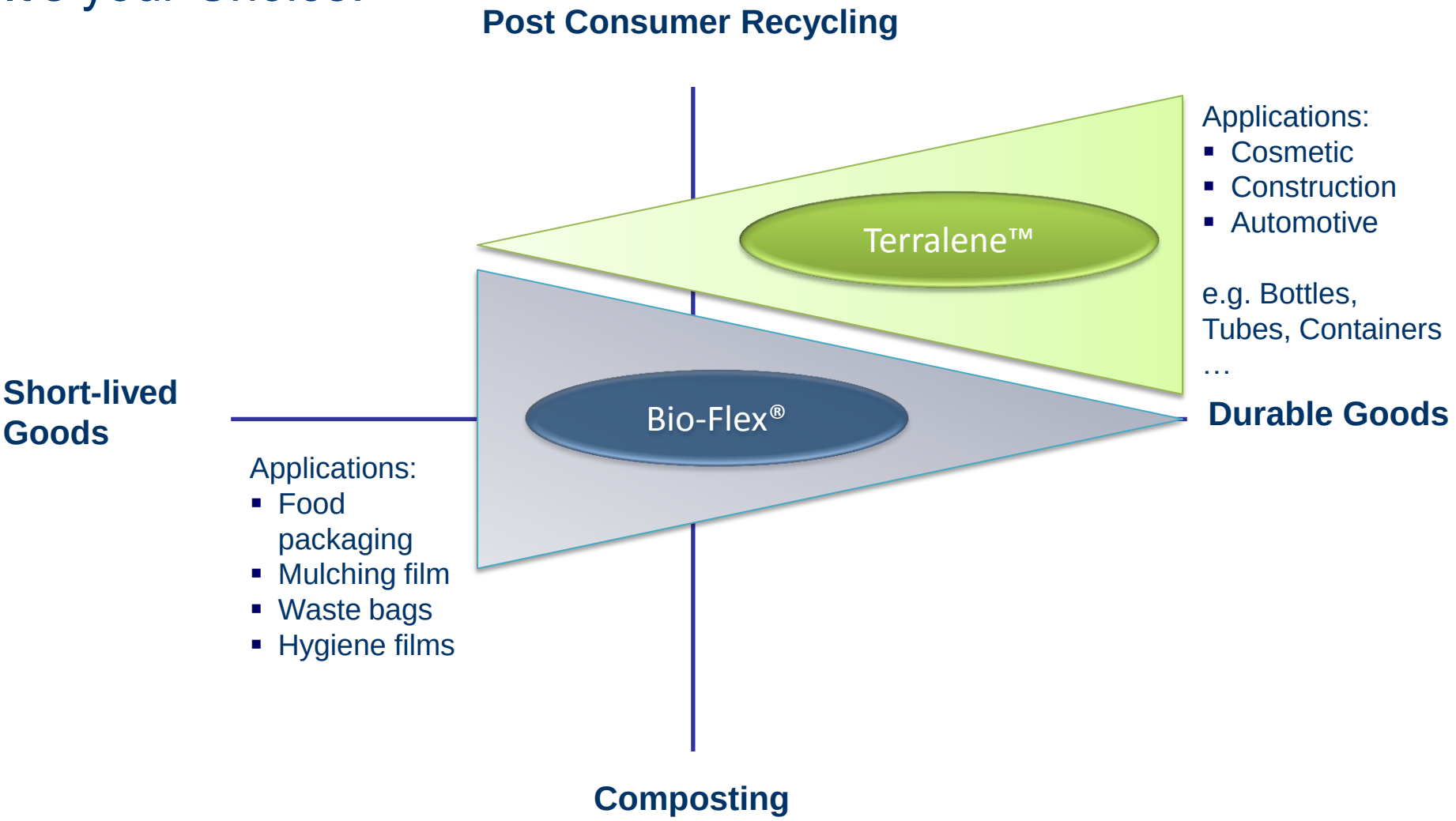
BIO-FLEX® | FIBROLON® | BIOGRADE® | TERRALENE™

Easy to handle Bio Resins

Processing | Price | Performance

Compounding is the Key!

It's your Choice:



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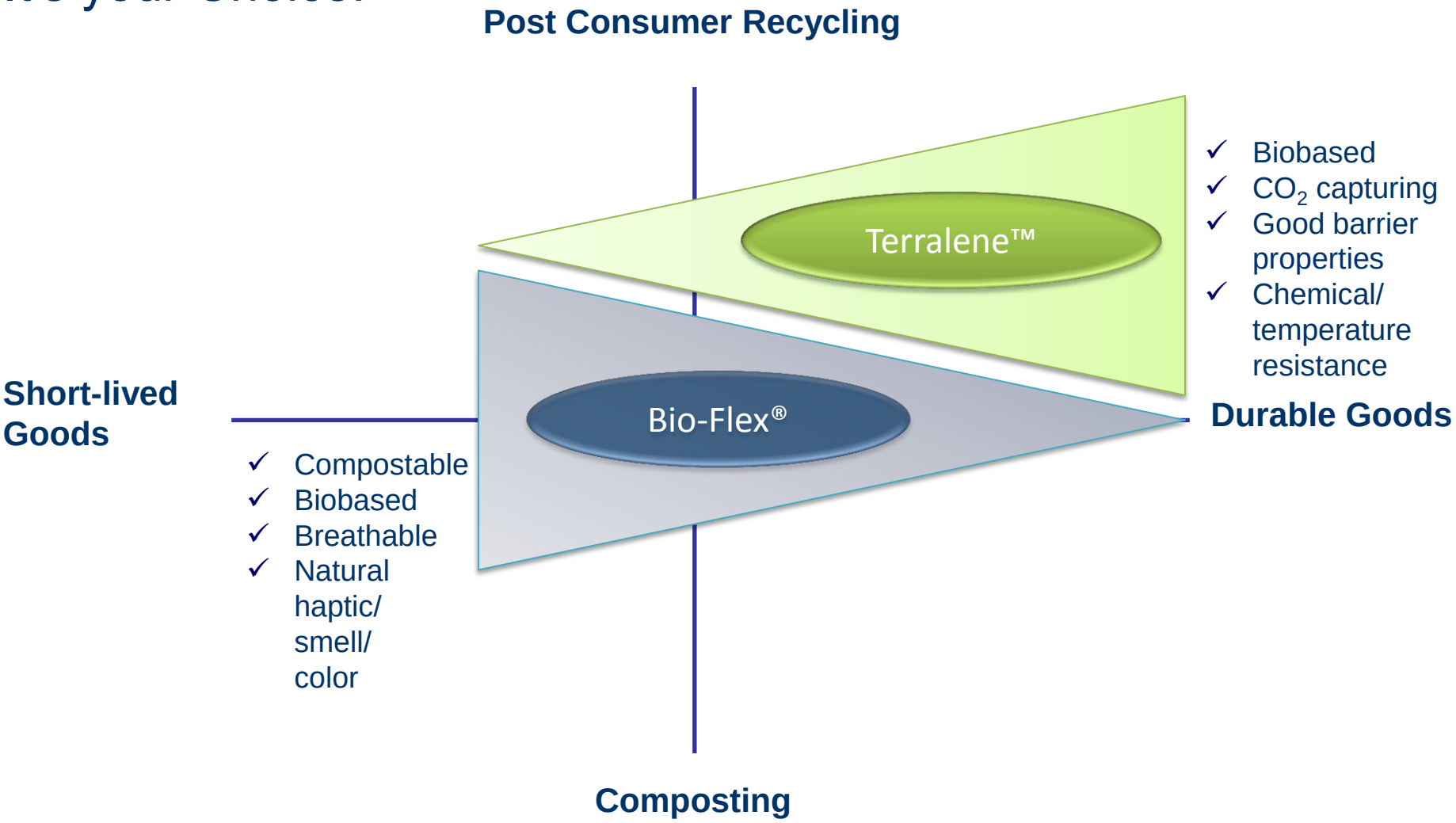
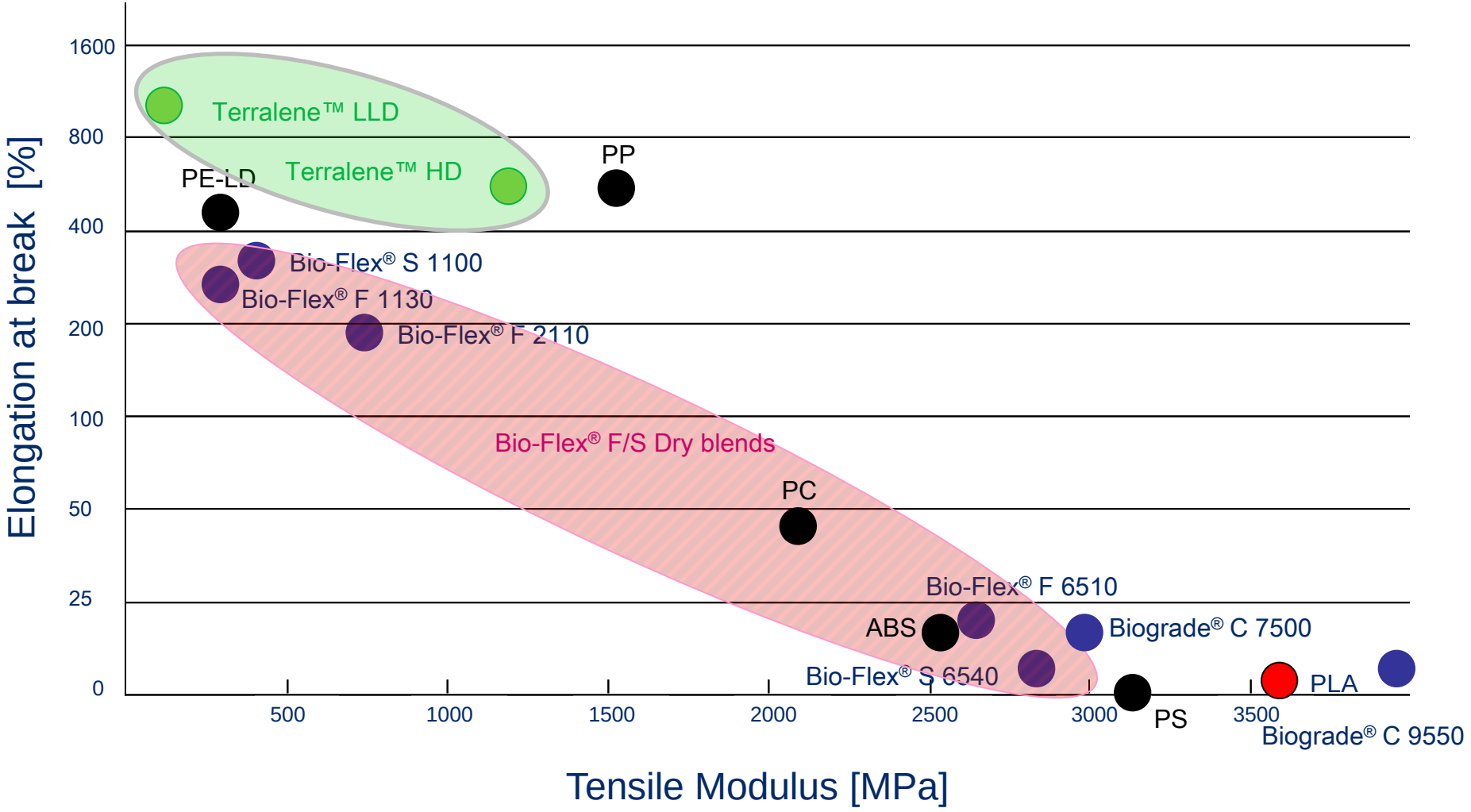


Properties of Bio-Flex® and Terralene™

(Bio-Flex® F/S compounds can be dry blended to adjust properties to requirements)



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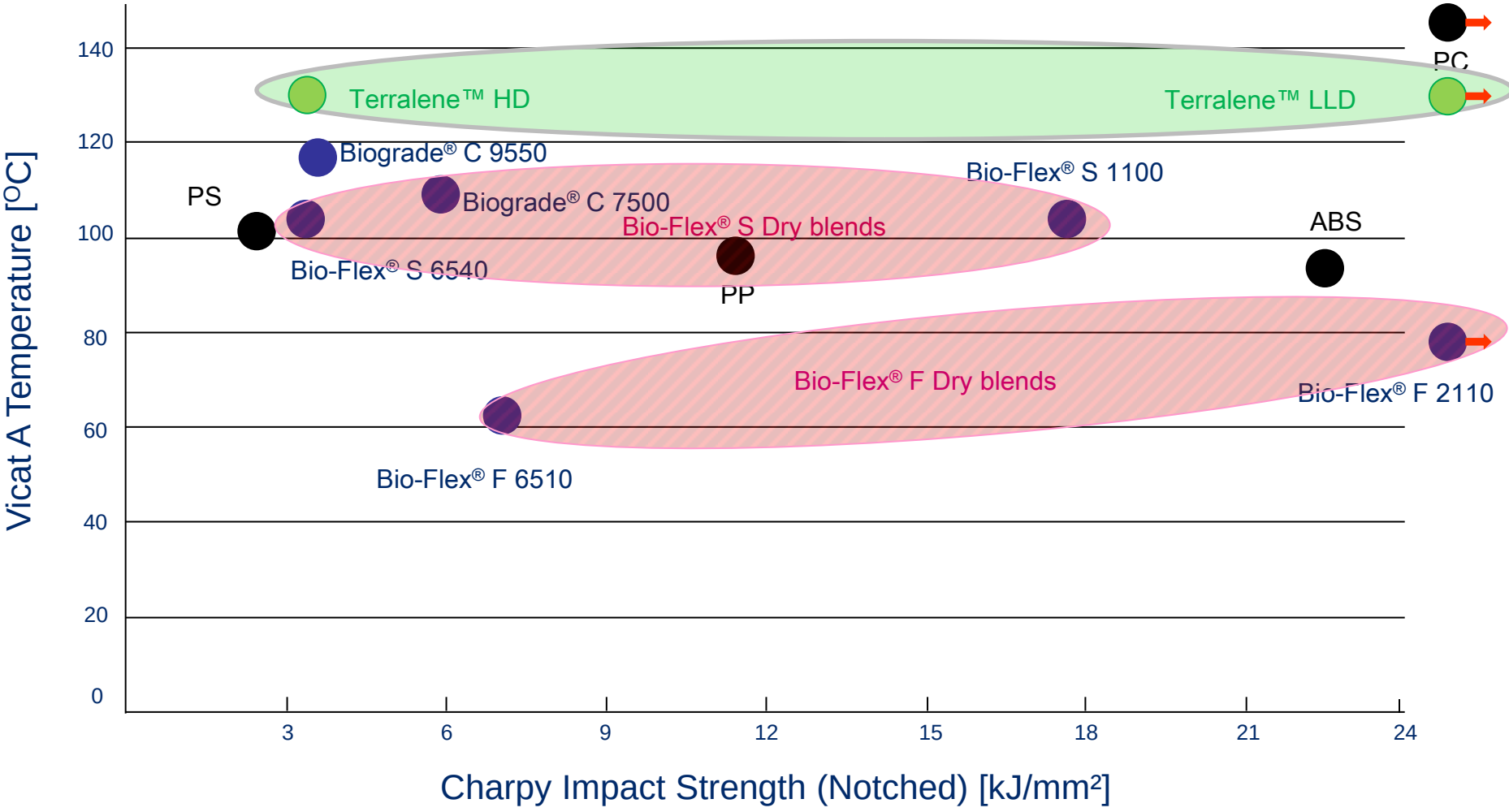

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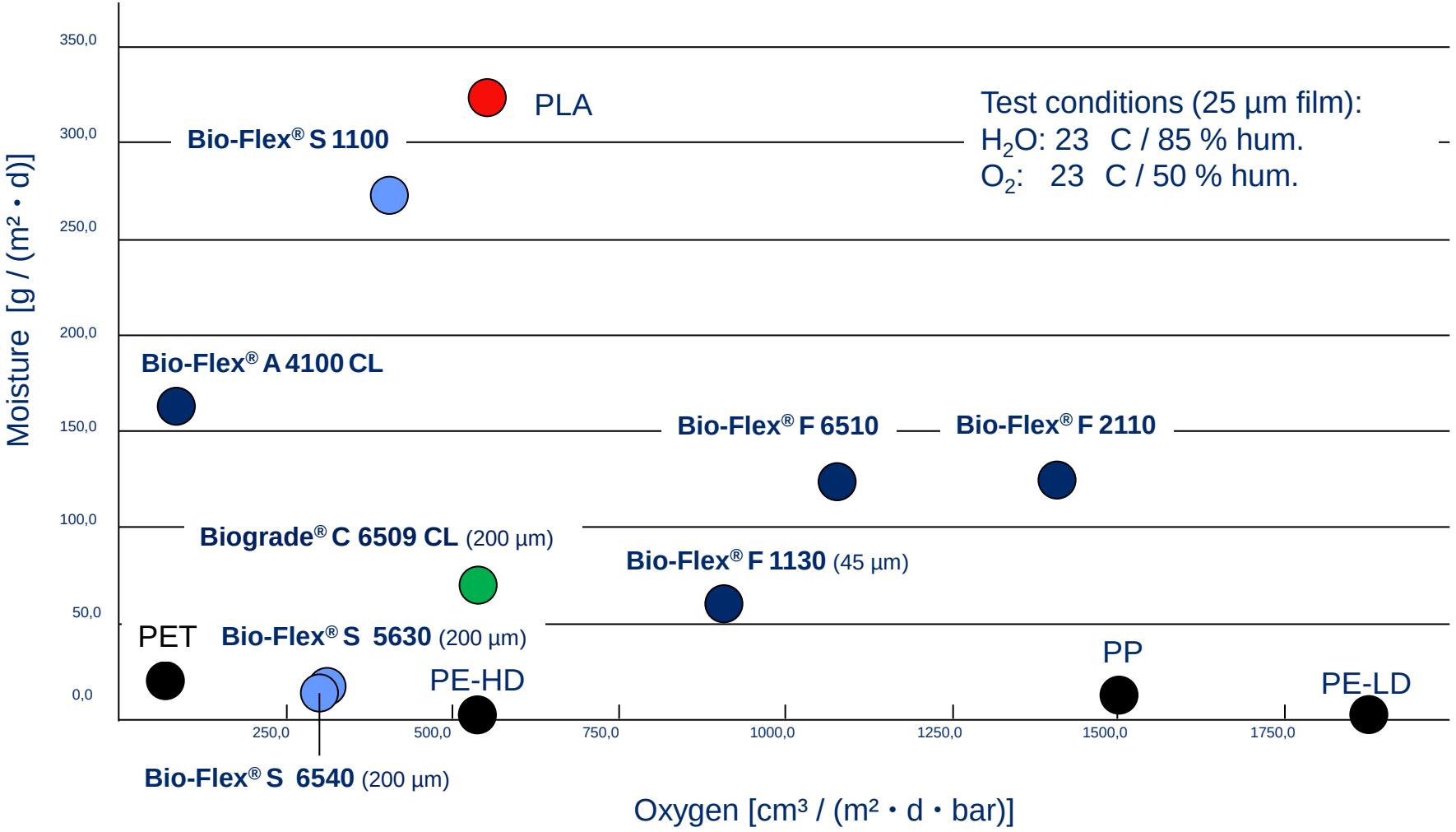

Cooperative Product Development

BIO-FLEX® | FIBROLON® | BIOGRADE® | TERRALENE™

Easy to handle Bio Resins

Bioplastics

- Supply tailor made material solutions!

Compound

- Support process, tool & combined solutions!

Product

- Scientific data to support your marketing!

Basics

Source: RITTER PEN

Bio-Flex® F 6510 and Biograde® C 9550:

- Pleasant to the touch
- Processing on multi-cavity molds
- Undercuts are possible

Computer Peripherals

Source: FUJITSU

Biograde® C 7500:

- High heat resistance
- Produced on existing molds
- Injection molding using hot runner system

Green IT

Cosmetics Packaging

Bio-Flex® F 6510 & F 2110 and Biograde® C 6509 CL:

- Chemical resistance
- Gloss and scratch resistance
- Combination of extrusion & injection molding possible

Catering

NEW Biograde® C 6509 CL:

- For injection molding and thermoforming
- Excellent transparency
- Thin wall injection moulding with 0.35 mm wall thickness

Sample Case

Beauty & Cosmetic Sample Case

- All plastics made by FKuR
- All articles available on the market
- Multiple production processes

Blow Moulding Applications

Terralene™

- Chemical Resistance
- Certified for contact with food
- High content of renewable resources
- Processing and Properties as with conventional PE

Metallization of Bio-Flex® Multilayers

Metallization and lamination of 3-layer-film made from Bio-Flex® A / F / A (20/60/20 %)

- Metallization and lamination of co-ex structure
- Excellent barrier properties
- High amount of renewable resources (~ 70 %)
- Tough and flexible

Multilayer Packaging

Bio-Flex® F/A Multi-Layer:

- Superb clarity and tear resistance
- Contains no starch or starch derivatives
- Printing without corona treatment

Fruit & Vegetable Packaging

Source: GIRO

Bio-Flex® F 1130 and F 2110 for Nets and Films:

- High elongation at break
- Excellent potential for printing and pigmentation
- Fully compostable according to ASTM D 6400

Deep Freeze Packaging

Bio-Flex® F/A Multi-Layer:

- Desirable surface gloss
- Packaging within V-FFS applications
- High impact resistance at freezing temperature

Thank you for your attention!

Bioplastics-
Engineered for Rigid Applications

www.FKuR.com