

Mono-Material Packaging: Masterbatches for Oriented PE Films





Introducing the Advanced Solutions product range which includes Mono Material Packaging solutions: Masterbatches for Oriented PE Films

At LyondellBasell, our large integrated footprint allows us to serve global customers and markets.

As many of our materials go into products that people use every day, at LyondellBasell we take our responsibility seriously. We have the potential – and responsibility – to use this scale and reach to make a positive impact. We are working to make meaningful progress to address some of the world's most pressing challenges.

With high demand in plastics packaging, a circular economy model becomes extremely important to take into consideration. A circular economy is a closed system that promotes reuse, encourages value extraction of recoverable material and avoids sending material to landfill.

Therefore, from product design to recycling technologies, the focus is on converting more material into recyclates and maximizing resource efficiency.

With our masterbatch portfolio and technical expertise we can offer solutions to support the creation of packaging which is designed for recyclability or which incorporates recycled or renewable-based content.

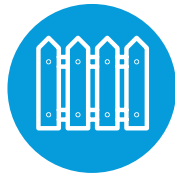
Re-design Multi-Material to Mono-Material Packaging

With growing demand for circularity, designing packaging today does not only require that the packaging offers performance to keep food fresh and protects the contents, but also that the packaging can be easily sorted and recycled in post-consumer waste streams.

Complex multi-material packaging is more difficult to recycle. Re-designing a multi-material packaging to a mono-material packaging can result in a more recyclable and sustainable solution while maintaining desired properties and performance.



Sealing



Barrier



Optics



Mechanical



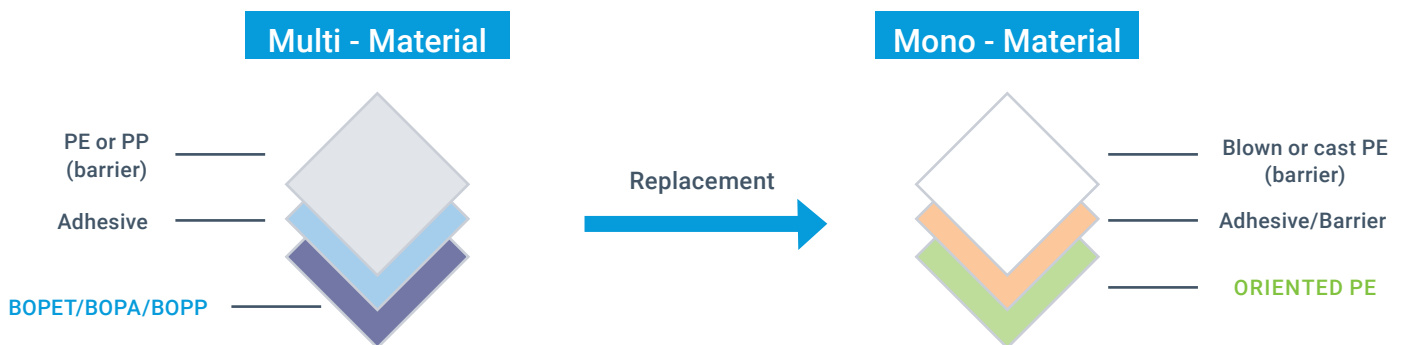
Resistance



Processability

Oriented Polyethylene films as part of the solution

- In multi-material laminates, Oriented PE films allows the substitution of non-polyolefin-based substrates such as bi-axially oriented Polyester (BOPET) or Polyamide (BOPA), in the manufacturing of mono-material PE packaging.
- Different types of Oriented PE films are available:
 - LL-BOPE & MOPE films applied as such or laminated to another PE film substrate
 - HD-BOPE films laminated to blown- or LL-BOPE film
- An extra barrier can be achieved by applying a coating via plasma enhanced chemical vapor deposition and/or co-extrusion of EVOH.



Bi-Axial Oriented PE film (BOPE)

- Tenter frame process
- Sequential or simultaneous stretching in MD & TD
- LLDPE/HDPE

Mono Oriented PE film

- Blown or cast process
- Mono orientation inline or offline, so called "MDO PE film"
- LLDPE/HDPE

A global network – close to you

By choosing LyondellBasell, you benefit from short transportation distances and quick deliveries. Currently, we are operating 20 service-orientated masterbatch centers worldwide. Each of them makes an important contribution to our dedication to be a pioneering solution provider.



● Masterbatch Sites

Masterbatch Advanced Solutions enable circularity



Design for Circularity
Supporting plastic sorting



CirculenRecover
Made from plastic waste through a mechanical recycling process



CirculenRevive
Made using an advanced (molecular) recycling process to convert plastic waste into feedstock to produce new polymers, which have a wide range of uses



CirculenRenew
Made from renewable feedstocks from bio-based sources, such as used cooking oil, which have a wide range of uses



Our Masterbatch Advanced Solutions

- **Design for Circularity:** Masterbatch solutions which support intelligent product design including NIR-detectable masterbatches for optimized polymer sorting in recycling facilities.
- **CirculenRecover:** Polymers containing post- or pre- consumer mechanically recycled content, and available as carrier resin in Masterbatch and Color Concentrates. We aim to help customers reach their recycled content goals with our offering.
- **CirculenRevive:** Polymers using advanced (molecular) recycling technology. These products enable our customers to produce new materials for applications that must meet strict regulatory requirements such as food packaging and healthcare items.
- **CirculenRenew:** Polymers based on renewable resources from bio-based sources using a mass balance approach, and available as carrier resin in Masterbatch and Color Concentrates. These products offer the same properties as their virgin counterparts and are ideal drop-in solutions for sustainable food packaging, films, toys and cosmetics.

With a diverse portfolio of polyolefins, advanced polymers, additive masterbatches and color concentrates, LyondellBasell offers a complete packaging solution that can be customized to meet unique customer needs.

These innovative materials optimize performance, appearance and processability.



Advanced Performance



Improved Processing



Enhanced Appearance

MATERIALS IN EUROPE	FILM	
	MDO-PE	BOPE
POLYMERS		
<i>Hostalen</i> HDPE	+	+
<i>Luflexen</i> LLDPE	+	+
<i>Lupolen</i> LDPE	+	
MASTERBATCHES		
<i>Polybatch</i> additives	+	+
<i>Polywhite</i> white	+	+

Masterbatches for BOPE / MOPE films

A portfolio overview of our masterbatch solutions in Europe

LyondellBasell provides a full line of masterbatch solutions that can be customized to meet Biaxially-Oriented Polyethylene (BOPE) and Mono-Axially Oriented Polyethylene (MOPE) film structure need.

In addition, new functional masterbatches have been developed for an optimized BOPE film extrusion process.

FUNCTIONALITY	POLYBATCH / POLYWHITE TYPES & FEATURES	DESCRIPTION
Antiblocking	Standard Low abrasion Low Coefficient of friction (COF)	The addition of antiblock in films prevents their tendency to stick together (block). A variety of antiblock masterbatches are available. Selection can be made depending on the required film properties (optical properties, surface roughness, scratch resistance). Specific masterbatches are available for the Enhanced Vacuum Deposition Process (PECVD) of Al, SiOx and AlOx. Special antiblock agents can be applied as non-migrating slipping agent.
Slip & combined Slip / Antiblocking	Migrating Non-migrating Permanent	The reduction of film to metal and film to film coefficient of friction (COF) enables higher processing and handling speeds. A variety of slip masterbatches are available providing low, medium and high COF reduction with a short, long or permanent performance in packaging film. Combined Slip / Antiblocking masterbatch are available, reducing complexity in film recipes.
Antistatic	Long term Short term Broad FC compliancy	The antistatic agents prevent electrostatic charges typically caused by friction between two materials for example in the production and converting of packaging film. Antistatic agents keep packed goods free of dust. Short- and long-term antistatic performance masterbatches are available with broad Food Contact Compliancy.
Processing aid	<i>Polybatch</i> AMF	Processing aids can be applied for multiple purpose. For instance, reduction of die deposits, improving co-extrusion of polymers with different melt viscosities and lowering filter pressure. In combination with enhanced appearance of film surface and clarity.
Heat & process Stabilizer	<i>Polybatch</i> AO	Antioxidants can protect polymers during processing as well throughout the package lifetime. Antioxidants also enable the use of recycled content in packaging by managing color-gel formation from polymer degradation.
White	<i>Polywhite</i>	LyondellBasell offers a wide range of high quality white masterbatches up to 80% titanium dioxide. <i>Polywhite</i> grades provide the packaging film high opacity and whiteness combined with high gloss. These masterbatches are appropriate for labels, lamination film, high quality print and many other applications.
Polymer modifier	<i>Polybatch</i> CPS	CPS masterbatches facilitate the extrusion and stretchability of polymers. Adding <i>Polybatch</i> CPS enhance appearance in transparency and further increase of stiffness and barrier properties.
Antifog	<i>Polybatch</i> AF	<i>Polybatch</i> anti-fog grades prevent condensation of water vapor on the surface of a plastic film. They keep packaging transparent, attractive and avoid the spoilage of the packed food. Anti-fog masterbatches offers short and long-term antifog performance. Typically applied in cold-fog applications such as fresh produce, meat, and refrigerated food packages as well as in hot-fog applications where food may be cooked or kept hot.
Matt	<i>Polybatch</i> DUL	<i>Polybatch</i> DUL grades provide packaging film a matt appearance or a soft-touch feel by co-extrusion and create a significant product differentiation. A full range of matt compounds is offered for lamination and heat-sealable films with different Seal Initiation Temperatures (SIT).
Cavitating	<i>Polybatch</i> PFPE	<i>Polybatch</i> PFPE provide cavitation of BOPE film – caused by inorganic particles in the core layer – that occurs during orientation. The well-defined voids create a lower density and pearlescent effect. <i>Polybatch</i> PFPE can be applied for labels, candy and chocolate bar wrappers and general overwrap film.

*More masterbatches are available with additional functionalities for further enhancements of your MOPE & BOPE film process and applications.

For more information about the Advanced Solutions for mono-material packaging and our comprehensive product range of PE, white masterbatches, functional additives and color masterbatches for oriented PE film applications, please contact our experts.

ABOUT US

LyondellBasell (NYSE: LYB) As a leader in the global chemical industry, LyondellBasell strives every day to be the safest, best operated and most valued company in our industry. The company's products, materials and technologies are advancing sustainable solutions for food safety, access to clean water, healthcare and fuel efficiency in more than 100 international markets. LyondellBasell places high priority on diversity, equity and inclusion and is Advancing Good with an emphasis on our planet, the communities where we operate and our future workforce. The company takes great pride in its world-class technology and customer focus. LyondellBasell has stepped up its circularity and climate ambitions and actions to address the global challenges of plastic waste and decarbonization. For more information, please visit www.lyondellbasell.com or follow [@LyondellBasell](https://www.linkedin.com/company/lyondellbasell) on LinkedIn.

For more information, go to www.lyb.com/en/products-technology/advanced-polymer-solutions/masterbatch/

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