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How barrier coatings can impact the recyclability of flexible plastic packaging

Enabling the recyclability of packaging is one important lever for the realization of a Circular Economy. Dr. Björn Ewig, Head of Technology Flexible Packaging EMEA at Siegwerk, gives insights into why barrier coatings are a true enabler to switch from multi- to recyclable mono-plastic packaging and how Siegwerk is driving its activities in this field.



Dr. Björn Ewig, Head of Technology Flexible Packaging EMEA at Siegwe

Q: Which role do barrier coatings play in the context of packaging sustainability?

A: There are various requirements that today's packaging needs to meet: From quality and safety standards particularly for food packaging through consumer expectations in terms of packaging functionality for the protection and durability of packed goods up to packaging sustainability. Especially, the demand for recyclable and eco-friendly packaging continues to grow further driving the need for redesigning packaging structures and switch from multi- to mono-material. Here, barrier coatings help to facilitate packaging complexity reduction as they can replace extra material layers by multi-functional thin coatings. In other words,

they support the switch from multi- to mono-material packaging by enabling to reduce the amount of packaging material, while keeping the functional properties of the final package and extending shelf-life.

Q: *And what's about their relevance for flexible packaging in particular?*

A: According to CEFLEX, 70-80% of flexible packaging is reported as mono-polyethylene (PE), mono-polypropylene (PP), or potentially a polyolefin PE/PP mix. The remaining 20-30% consist of multi-layer-multi-material flexible packaging, often due to limited functional performance of mono-material-packaging. The use of various material layers significantly complicates the packaging's recyclability. While it is meanwhile possible to de-laminate different layers to achieve high quality recycle it can still be expensive or even impractical to separate different materials. Developing highly functional barrier coatings that enable more mono-material flexible packaging would significantly improve the recyclability of flexible packaging in the sense of a Circular Economy. Printable barrier coatings offer a more sustainable alternative to partially non-recyclable film, foil-based or metallized barriers enabling less complex packaging structures compatible with existing waste streams.

Q: *What does 'more sustainable alternative' concretely mean?*

A: Currently available barrier options include e.g., PET/PE-EVOH-PE, PET-PVDC/PE, AlOx PET laminate, aluminum laminates or metallized films. These structures are not recyclable. By using printable barrier coatings on mono-plastic packaging, either as a surface print structure or as laminate - in particular when used in combination with a delamination primer - the recyclability of a package and the quality of the recycle can be increased dramatically. Flexible mono-plastic laminated packaging solutions offer the potential to be recycled in the same collection stream as similar plastic material. In other words, compatible printable barrier coatings are an environmental-friendly alternative to non-recyclable plastic layers that allow the end packages to be simply and fully recycled.

Q: *What kind of barrier functionalities are typically required?*

A: Commonly required properties include gas barrier for oxygen or CO₂, as well as the protection against UV light, oil & grease, moisture/ water vapor or volatile organics to e.g., preserve the aroma of the packed food. By applying thin layers of functional coatings, the barrier properties of the printed substrate get efficiently enhanced. Important requirement: The coating should not impact a substrate's recyclability.

Q: *What are Siegwerk's activities in this area?*

A: For quite some time already, we are putting a significant amount of resources in the development of high-performing printable barrier coatings to replace traditional packaging structures and make recyclable mono-plastic packaging a reality. Together with partners and customers, we are working on solutions designed to improve the recyclability of laminated structures while delivering on consumer safety and functionality. We strongly believe that together we can make a difference and drive the packaging industry towards a Circular Economy.

Q: *What kind of Barrier solutions does Siegwerk already offer?*

A: Today we can offer barriers for oxygen and other gases, transparent barriers for UV-light, and barriers for grease and moisture. But we do not just sell these as single barrier products. Most barrier solutions work best when applied in combination with other components like e.g. optimized inks, heat seal lacquers , OPVs, etc. that are fine tuned to support the barrier functionality and additionally make sure that all additional requirements for the packaging can also be met.

For more information about Siegwerk's approach and solutions for the realization of a Circular Economy please visit: <https://www.siegwerk.com/en/circular-economy/our-circular-solutions.html>

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