PRESSEINFORMATION

New opportunities for bio-based film applications

Blends of bio-based polyesters as a building block for replacing conventional polyolefins

New findings from the Fraunhofer Cluster of Excellence Circular Plastics Economy CCPE show how commercial PBSA/PLA blends can be specifically tailored through industrial processing methods to make them suitable for flexible film applications. This opens up concrete bio-based alternatives to petro-chemical plastics.

Against the backdrop of increasing regulatory requirements, growing sustainability goals, and mounting pressure to phase out fossil fuels, bio-based and potentially biodegradable materials are increasingly coming into focus within the plastics industry. What matters here is not just the choice of material, but especially the interplay between processing, structure, and resulting properties.
Scientists at Fraunhofer CCPE systematically investigated the influence of processing and material composition on the properties of PBSA (polybutylene succinate-co-adipate)/PLA (polylactic acid) blend films.

Plastic blends for application-specific property profiles

The study demonstrates a clear correlation between processing, microstructure, and mechanical behavior. Both cast films and blown films exhibit a lamellar blend morphology at the microscale but differ on the nanoscale. In cast films, processing leads to an orientation of the semi-crystalline PBSA structures, whereas no comparable crystalline preferred orientation is observed in blown films. The two film types examined thus cover a wide range of stiffness and strength and achieve property levels relevant for the substitution of typical polyolefins.

Tailored property tuning for industrial applications

For companies across the value chain – from compounding and film extrusion to packaging development – the results show that the properties of PBSA/PLA blends can be specifically tailored for material and process development. This makes it possible to evaluate the substitution potential relative to established materials such as High-Density Polyethylen (HDPE) in a differentiated manner and to design solutions tailored to specific applications. Since processing took place on industry-standard equipment, the findings are directly transferable to real-world production conditions and provide a robust basis for development decisions.

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At the same time, further developments are necessary for broad industrial application to bring the specific applications to market maturity. To this end, Fraunhofer LBF and Fraunhofer IAP are seeking collaboration with companies and partners who wish to make direct use of the published results or build upon them in follow-up projects addressing topics such as material optimization, processability, application testing, or scaling.

Publication

The results were published in the journal Polymers: Guru Geertz et al., From Film Processing to Microphase Orientation: Structure–Property Relationships in Commercial PBSA/PLA Blend Films, Polymers 2026, 18, 761., DOI: 10.3390/polym18060761

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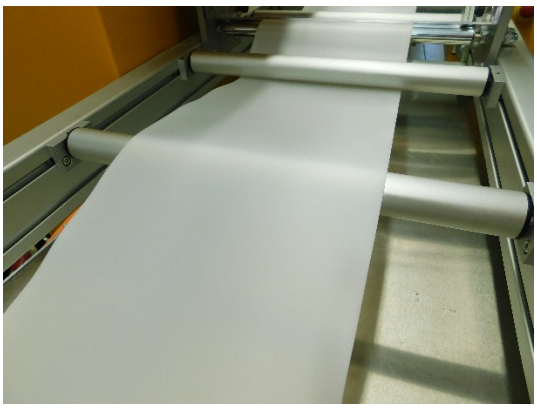

Abb. 1 © Fraunhofer IAP

Beschriftung

Flat film extrusion of a bio-based PBSA/PLA blend at the Schwarzheide Processing Technology Center at Fraunhofer IAP.

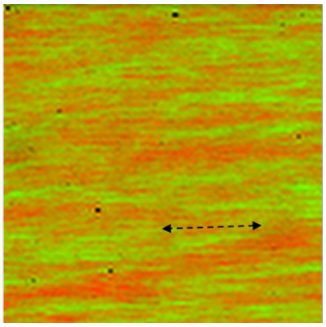

Abb. 2 © Fraunhofer CCPE

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Confocal Raman image of a PBSA/PLA flat film with processing-induced morphology. The double dashed arrow indicates the direction of extrusion