Session 7	Scale-up of novel biomaterials and processes, powered by INN-PRESSME
Pitch Title	Enhancing Barrier Properties of Bio-Sourced Materials Through Multi-Nanolayer Co-Extrusion Process
Company	IPC
Speaker	Florence ISNARD
Keywords feedstock	bio-sourced, poly(hydroxyalcanoate)
Keywords technology	Packaging
Keywords End-Product	multinanolayer coextrusion

Abstract:

Barrier performance is critical across various industries, particularly in transportation and packaging. One of the latest techniques to achieve superior barrier properties is the multi-nanolayer process. This technique enables the production of multilayer films containing up to 1,025 nanometric layers through forced assembly co-extrusion, which leverages confinement effects to enhance the material's performance. It has been successfully applied to conventional materials, such as polyolefin-based multilayer films, resulting in high-barrier properties.

While this process has been extensively studied for traditional materials, its application to bio-sourced multilayer films is still underexplored, despite the growing ecological challenges. For example, biodegradable PLA/PBSA multilayer films, containing only 20% PBSA by weight, have demonstrated a remarkable improvement in barrier properties, approximately two orders of magnitude [1].

At IPC, ongoing work seeks to validate this concept by focusing on bio-sourced materials through INN PRESSME case studies and Open Call projects. In collaboration with Helian Polymers, the PACK-PHA project aims to develop bio-based, biodegradable barrier packaging materials using PHAs (polyhydroxyalkanoates). This includes exploring different PHA building blocks and processes, such as cast sheet extrusion, monolayer and multilayer film production, and foaming. Another relevant collaboration is with SeaBird, which aims to create home-compostable flexible films with sufficient barrier properties, particularly low water vapor permeability, to preserve dry food.

[1] Messin T., Follain N., Guinault A., Sollogoub C., Gaucher V., Delpouve N., Marais S. Structure and Barrier Properties of Multinanolayered Biodegradable PLA / PBSA Films : Confinement Effect via Forced Assembly Coextrusion. ACS Publication 9 (34) (2017) 29101-29112.