

Optimization of coating techniques for the application of functional coatings on biodegradable films using roll-to-roll (r2r) processing

Project type: Bachelor semester project (Spring 2025)

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Collaboration: BioApply SA

Description:

This project investigates the application of functional coatings to biodegradable polymer films using roll-to-roll (R2R) processing techniques. The primary focus is on understanding the fundamental principles of continuous coating processes and optimizing key process parameters to achieve consistent, high-quality coatings. A lab-scale R2R pilot system at EPFL's LPAC will be employed for experimental investigations, offering valuable insights into the field of continuous manufacturing processes. The project aims to establish effective coating application methods and develop testing protocols to assess the performance and quality of the coatings.

The project is structured into the following key stages:

- **Fundamentals of R2R Coating Processes and Hands-on Training:**
An introduction to the core principles of R2R technology, including practical training on the operation of a lab-scale R2R pilot system. This stage provides a foundational understanding of the process and its capabilities.
- **Optimization of Process Parameters:**
Investigation into how process variables, such as coating speed, curing conditions, and substrate properties, influence coating quality. The goal is to identify optimal conditions that ensure uniformity, adhesion, and compatibility with biodegradable materials.
- **Material Characterization:**
Conducting material characterization tests, including microscopy, thickness measurements, and mechanical testing, to evaluate the quality of the coated films produced under different sets of parameters. The findings will be analyzed to establish correlations between the film production techniques and the resulting properties of the films.

Confidentiality: As this research is part of an industrial project, the student will be required to sign a nondisclosure agreement (NDA) before commencing work on the project.