

# FOAMEX

## Development of a stable extrusion foaming process for Polylactic-acid (PLA)

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### Background

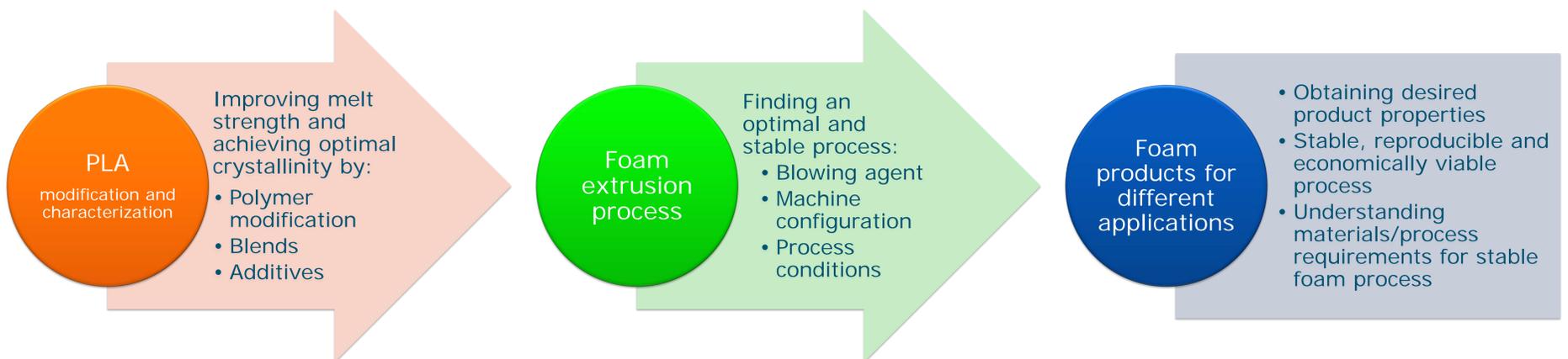
Polylactic acid (PLA) is produced from renewable raw materials originating from crops such as corn and sugar cane. Some inherent properties of PLA have limited its use in several applications. Within the FOAMEX project, the participants want to take the production of PLA based extrusion foams to a next level. There are few examples of extrusion foaming of PLA on an industrial scale. For a commercial breakthrough, improvements are needed with respect to both the material (PLA) and to the extrusion foaming process itself (equipment, conditions).

### Objective

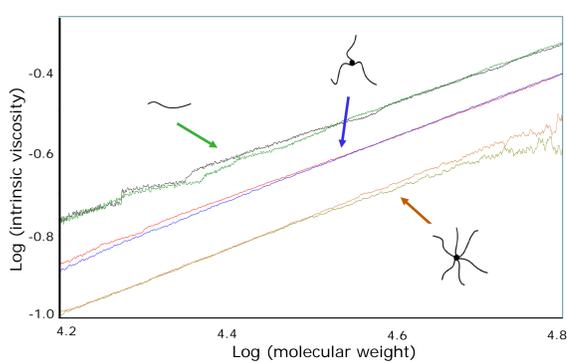
The aim of this project is to develop an extrusion foaming process for polylactic acid (PLA). This novel extrusion foaming process should be reproducible, stable, economically viable and scalable. Foam cell size and required density should be adjustable on the final application.



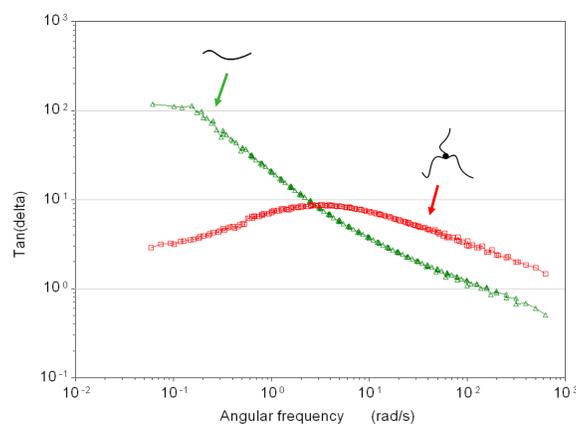
### Approach



### Results



**Figure 1.** Intrinsic viscosity vs molecular weight of three different PLA's produced with different architectures, linear and 3 arm star shaped are produced at large scale at BEWi-Synbra. 6 arm star shaped was produced at WFBR lab-scale.



**Figure 2.** Rheological properties of branched and linear PLA molecules indicating broadening of the processing window.



**Figure 3.** Stable foam production at Sulzer. SEM example of a foam structure.

### Project highlights

- Patent application
- Industrial scale production of 3 arm star shaped PLA at BEWi-Synbra
- 4 series of PLA foaming trials at Vinventions
- 3 series of PLA foaming trials at Sulzer
- Stable PLA extrusion foaming process at large process window
- Fundamental insight in foaming behavior based on rheological properties
- Inline rheometry of CO<sub>2</sub> containing PLA

### Future outlook

- Usage of branched PLA types for various processing techniques
- Applications:
  - ✓ Foamed beads
  - ✓ Foamed profiles
  - ✓ Foamed sheets
  - ✓ ...

### Acknowledgements

This work is part of the research programme Biobased Performance Materials, which is (partly) financed by the Top Sector Chemistry.



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