

SPECIFIC Starch – Poly Ethylene Compounds in Films with Improved barrier Characteristics

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Background

This consortium is working on the development of industrial films from blends of thermoplastic starch and polyethylene. The great advantage of the combination of these materials is that they together improve the barrier properties of plastic films.

Polyethylene is known for its excellent waterproof properties, but it is permeable to oxygen and other gases. Starch is a good oxygen barrier, but is not water resistant. A good mixture of both materials should result in products with high water and oxygen barrier.

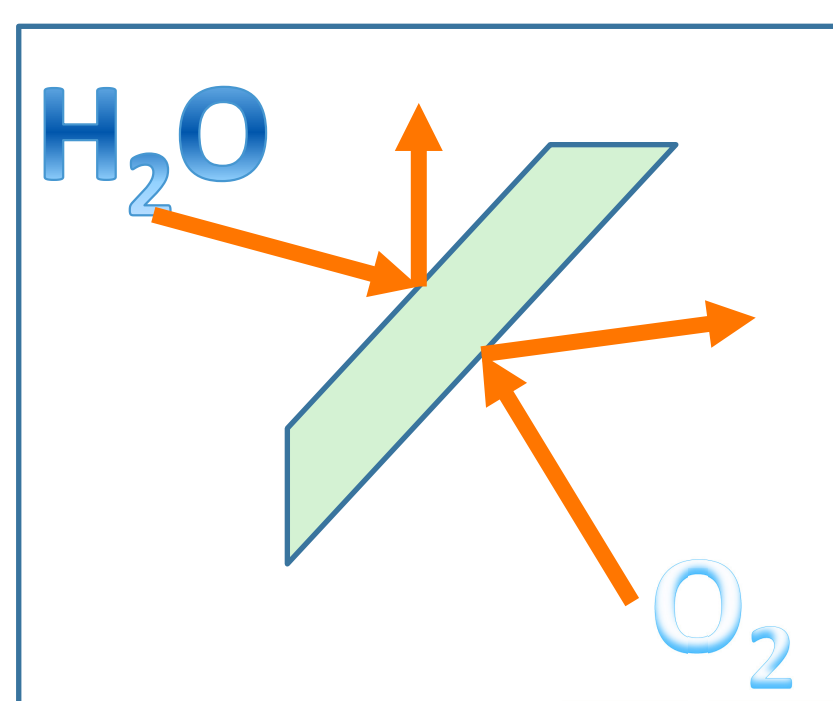


Figure 1. Water vapour and oxygen barrier

The combination of both materials in a blend is currently not used for the production of films, but is potentially very interesting. Gradually bio-based films can replace the existing petroleum-made films.

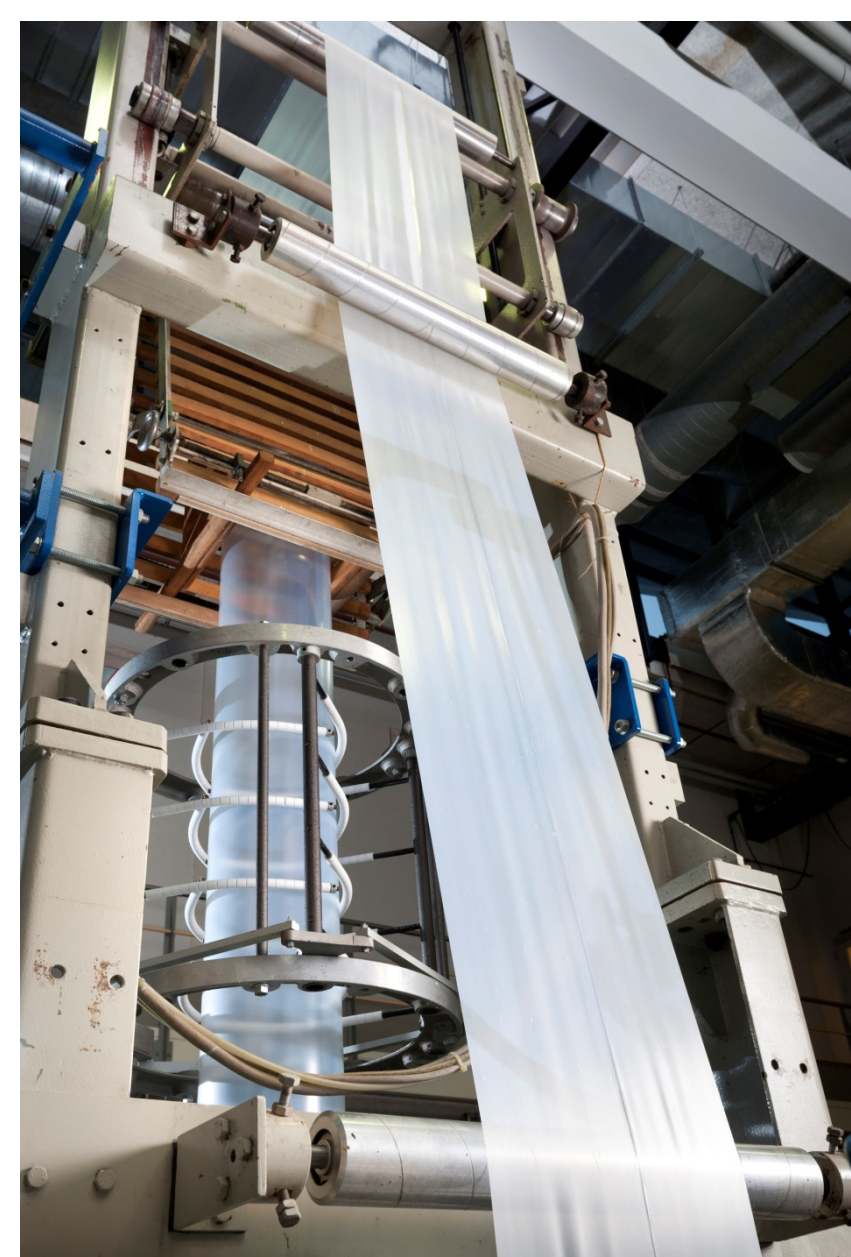


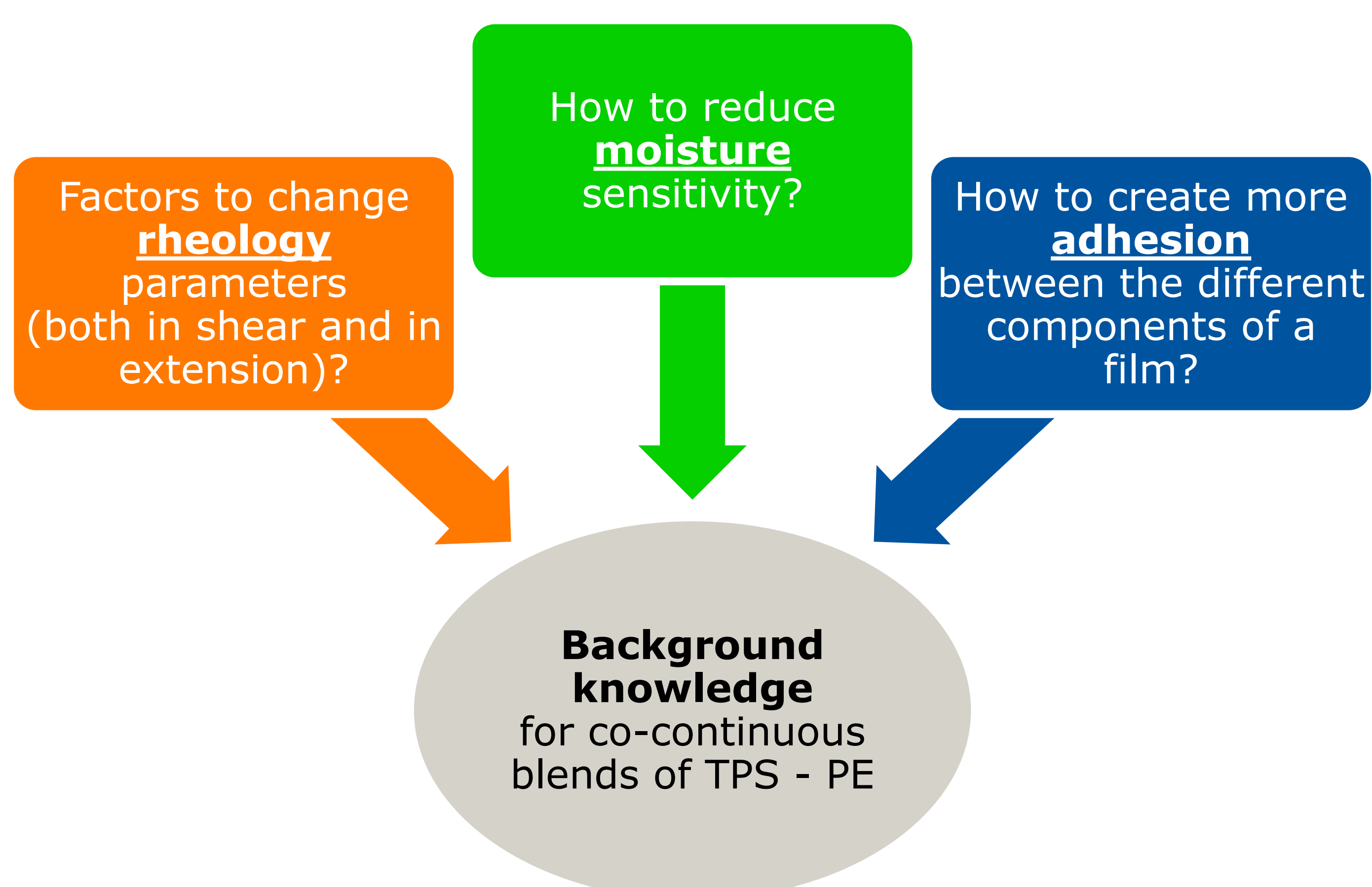
Figure 2. Film blowing equipment at FBR

Objective

- To develop background knowledge on compounds based on a mixture of non-renewable polyolefins (specific LDPE) and renewable ThermoPlastic Starch (TPS), suitable for the film-blowing process
- At least 50% renewable raw materials
- Suitable for food packaging

Approach

Key questions



Measuring methods

Different methods have been applied in the literature to correlate the film blowing properties and blend morphology to basic rheological properties like shear and elongational viscosity. In this project a capillary rheometer as well as a rotational rheometer will be used to study PE, TPS and PE/TPS blends.



Figure 3. Rotational rheometer at FBR with extensional viscosity fixture intended to be used for determining shear and extensional viscosity parameters



Figure 4. Advanced Capillary Extrusion Rheometer

Project partners

• Avebe u.a.

AVEBE is one of the largest potato producers in the world and remains in constant search for new outlets for its products. Potato starch has a good potential as a component in bio-based films. Avebe has a lot of knowledge in many applications where starch is used as a rheology modifier. Avebe's core competence is the understanding of starch structure function relationships. Avebe is leading edge in physical, chemical and enzymatical modification, enabling targeted structure changes in the starch component for optimizing the composite material.

• Sabic Technology & Innovation

Sabic is among the largest polyolefin producers in the world. Actual issues in the way of working of Sabic are:

- Sustainability is a priority at Sabic – Developing new products, energy and applications that respond to customers' sustainability needs
- Reducing the intensity of our global environmental footprint.
- Investing in responsible supply chain and manufacturing solutions that reduce environmental impact

Sabic has been active for several years in the field of starch - polyolefin formulations.

• Wageningen UR Food & Biobased Research

Development of new, non-food starch-based formulations and development of products thereof is an important activity for WUR-FBR. FBR wants to remain a leader in these fields. FBR is specifically interested in further development of the required structure-property relationships to realise the food packaging films.

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