

## **How to Make the Best of PLA and PBS: Optimising Bio-Based Blends and Compounds with High Throughput Screening and Predictive Models**

Polymer blends and compounds are often complex systems, consisting of one or more polymers, additives, fillers, reinforcing fibers, softeners, colorants, and more. Optimizing the properties for certain applications can therefore be quite challenging.

Polymaterials X-Plorator High Throughput Screening system can run up to 30-40 different compounds per day, including compounding, injection molding, and testing. In order to ensure compatibility with conventional testing, the X-Plorator uses standard ISO samples and testing methods.

Combined with mathematical Design of Experiments (DoE), large experimental plans of 100-200 different compounds can be run within one or two weeks. The result are not only the experimental data, but beyond that there is the possibility to obtain a predictive model. This can be used for optimization, and can also suggest changes in composition for new requirements in the future, requiring no or only a limited number of additional experiments.

The presentation will show the possibilities of a set of models created with PLA as the major component in blends and compounds. The models are based on a set of 1500 experiments, and can be used to predict suitable compositions for desired combinations of mechanical properties, optical properties, rate of crystallization, and softening temperature. Targets of optimization can be e.g. meeting the property profiles of conventional petrochemical plastics with blends with a maximized content of bio-based polymers, or optimizing certain properties such as cycle time in injection molding, impact toughness, and others. Additions data can be added in the future to expand the range of properties that the models can cover.