

Thermoplastic cellulose biocomposites by melt processing

Aim and objectives

The main objective of the project was to compare biocomposites from nanofibres with composites from wood fibers, and to develop a method for the decomposition of wood fibers into nano fibers in an industrial process. The material form is thermoplastic granules which can be used in large-scale applications, e.g., packaging, and furniture.

Method and participating organizations

The area is thermoplastic composites for use in industrial products. The challenges studied deal with production technologies for the realization of nanocomposites for large-scale industrial use. The value chain includes pulping companies for chemical modification of pulp, polymer and compounding companies, as well as end consumers. Activities include chemical pretreatment, compounding and characterization of nanocellulose and biocomposites, including properties.

Results

Wood fibers were pre-treated and then compounded with a compatible biopolymer. It led to the disintegration of wood fiber to the nanofibers. Biocomposites from the "big" wood fibers were compared with composites from nano-fibers. The process is based on mixing the components with water as processing aids. The results showed that nano-fibers provide much better performance than wood fibers. The concept of decomposing wood fiber to the nanofibers in the extruder was successful.

Future potential

The project is based on a creative idea that applies to existing industrial technology, and the technology can be rapidly scaled and converted into industrial biocomposites. The entire value chain, from the forest industry through the chemical industry and users such as IKEA can benefit from the technology. The forest industry can develop a new generation of modified wood fibers that are adapted for biocomposites.