

## PROJECT: LIGHT MATERIALS 4 MOBILITY

In current serial applications, bio-based materials already make a valuable contribution to achieving national and European climate protection and sustainability targets in transportation. However, it has not yet been possible to use these materials in technically sophisticated components. In "Light Materials 4 Mobility", novel, sustainable, material- and process-related lightweight solutions were developed with the aim of maximizing resource efficiency.

The subproject "Bio-Tape" had the focus on the development and demonstration of a fiber-reinforced biopolymer system for lightweight structures based on:

- optimized and recyclable polylactide (PLA) formulations and
- basalt -fiber-reinforced UD-tapes with a PLA matrix

The recyclability was demonstrated by applying an alkaline or enzymatic treatment. The recycling method enables the recovery of the basalt fibers and monomeric lactic acid.

The developed PLA formulations have an increased heat distortion temperature (up to 140 °C), improved crystallization (40° Kelvin higher crystallization temperature) and a higher degree of crystallization (> 40 % compared to unmodified PLA). Furthermore, ductility (notched impact strength > 5 kJ/m<sup>2</sup>) and hydrolysis stability were improved. The modified matrix systems enabled the production of basalt-fiber-reinforced UD-tapes with homogeneous fiber distribution and fiber mass fractions of up to 63%. The mechanical composite properties could be raised to a level comparable to that of the polypropylene/basalt fiber reference system.

UD-tape processing technology and injection molding processes were used to manufacture a seat structure to demonstrate the potential of the fiber-reinforced biopolymer system.



*Hybrid seat back made of PLA and basalt fiber.  
Photo: Fraunhofer ICT.*



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