Bioplastics goes automotive!
Biogen filaments for 3D printing of automotive parts

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Bioplastic goes automotive!

The automotive industry is changing. Biogenic or biobased components use resources of natural origin. Ecological criteria plus renewablity and availablity play a bigger role in future materials selection.

Conventional products may be replaced by biogenic and biobased materials in the near future.

A completely biobased composite material with improved mechanical and tribological resistance is introduced in this study.

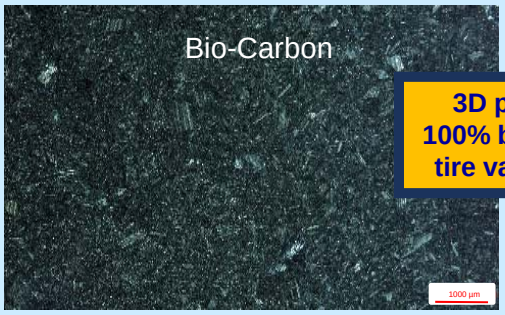
A 1.75 mm thick filament was produced by compounding biobased carbon with the biopolymer polylactide PLA and subsequent extrusion.
An automotive part was 3D printed with filament laying deposition FDM method.

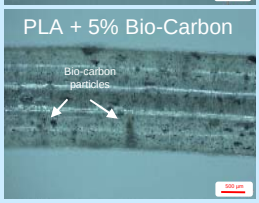
3D printing by the FDM method

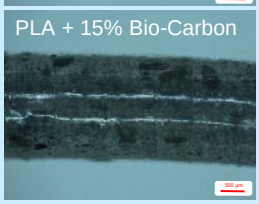
Bio-Carbon reinforced polylactide filament

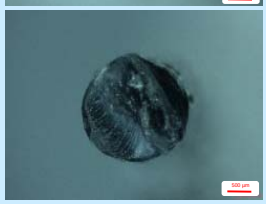
3D printed 100% biobased tire valve cap

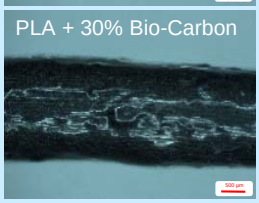
3D printed 100% biobased seat belt plug raise clip

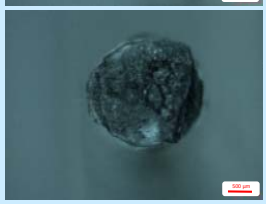




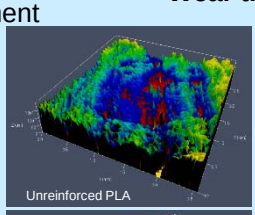


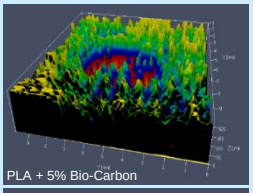


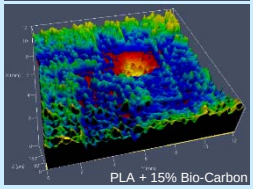


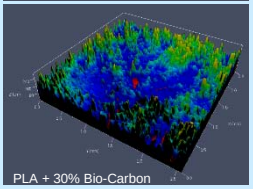


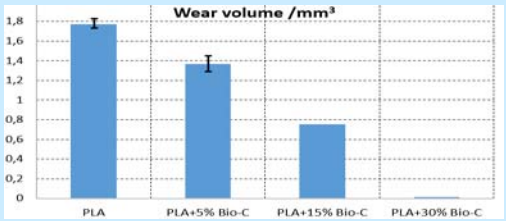
Wear traces

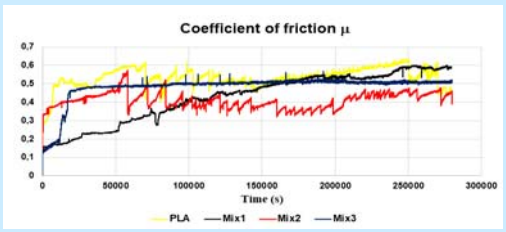












Results

Filaments for 3D printing

The fluctuation in friction is reduced due to the reinforcement of polylactide with 5 and 30 vol.-% bio-carbon. The distribution of bio-carbon particles appears homogeneous for filaments with 15 vol.-% or with 5 vol.-% bio-carbon. For the 30 vol.-% bio-carbon addition, the distribution of particles can not be identified by stereomicroscopic observations.

Wear volume

PLA have the highest wear depth and wear width. Therefore, unreinforced PLA exhibit the highest wear volume. Superior wear resistance was observed in PLA with 30 vol.-% bio-carbon compared with unreinforced PLA and the PLA with 5 vol.-% or 15 vol.-% bio-carbon.

Coefficient of friction: COF

The special surface topography of PLA reinforced with 30 vol.-% bio-carbon may be positive to ensure a stable COF and retard short or long term wear fatigue due to COF fluctuations.

Acknowledgement

The project BUNT „Biogene Hochleistungskarbone“ no. 2015-0012 is financed by the Thuringia Ministry TMWWDG. The authors acknowledge the financial support deeply.