Projekta nosaukums: Risinājumu rīks optimālai projektēšanai viedo polimēru nano kompozītmateriālu struktūru izveidei izmantojot 3D printēšanu
Project name: Decision tool for optimal design of smart polymer nanocomposite structures produced by 3D printing
Projekta līguma numurs/No of the Agreement: 1.1.1.1/19/A/031

PROJEKTA DALĪBNIEKA DALĪBA STARPTAUTISKAJĀ KONFERENĒ "Composites meet sustainability" ECCM20

PARTICIPATION IN THE INTERNATIONAL CONFERENCE "Composites meet sustainability" ECCM20

Projektā iesaistītais vadošais pētnieks uzstājās starptautiskajā konferencē "Composites meet sustainability" ECCM20 ar zinātnisko konferenču rakstu "Mechanical characterisation of some polymers used in 3D printing " (autori: Andrejs Aņiskevičs, Edmunds Zīle, Olga Bulderberga, Daiva Zeleniakiene).

The leading researcher involved in the project presented at the international conference "Composites meet sustainability" ECCM20 with the scientific conference article "Mechanical characterization of some polymers used in 3D printing" (authors: Andrejs Aniskevičs, Edmunds Zīle, Olga Bulderberga, Daiva Zeleniakiene).

Konference norisinājās laika periodā no 26.06.2022. līdz 30.06.2022. Lozannā, Šveicē.
The conference took place in the period from 26.06.2022. until 30.06.2022. Lausanne, Switzerland.

Plašāka informācija par konferenci: https://eccm20.org/
More information about the conference: https://eccm20.org/

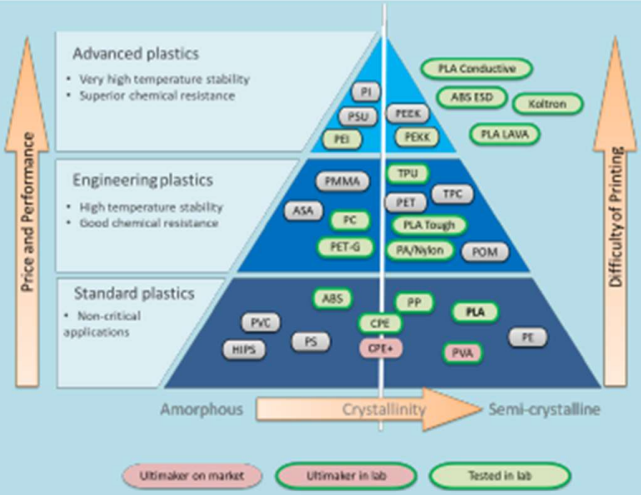
Informāciju sagatavoja: Viktorija Juhņeviča, viktorija.juhnevica@lu.lv
Informācijas sagatavošanas datums: 30.06.2022.

LATVIJAS UNIVERSITĀTE
NACIONĀLAIS ATTĪSTĪBAS PLĀNS 2020
EIROPAS SAVIENĪBA
Eiropas Reģionālās attīstības fonds
IEGULDĪJUMS TAVĀ NĀKOTNĒ

Mechanical characterisation of some polymers used in 3D printing

Andrey Aniskevich, Edmunds Zīle, Olga Bulderberga, and Daiva Zeleniakiene

UNIVERSITY OF LATVIA INSTITUTE FOR MECHANICS OF MATERIALS
ktu kauno technologijos universitetas 1922



Filament polymers pyramid. 16 polymers were tested.

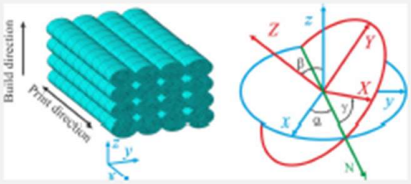
OPTITOOL

This paper performed **a comparative evaluation of the mechanical characteristics** of some thermoplastic polymers processed by FDM.

- The **density** of extruded fibre is higher than the filament density (by 4.4% in average). The "production" density is always lower than the "true" density on average by 3.6%.
- The **elastic modulus** of "as-produced" filaments is lower than the modulus of the extruded mono-fibres by 12% on average. For PLA materials, this difference is up to 20-30%.
- Due to the technology and presence of voids **essential anisotropy** was revealed, the transverse elastic modulus and strength are always lower than its longitudinal ones.
- Tests showed that **adhesion** at hybrid PLA contact is only slightly affected by the presence of colourant additives in one of the parts.

The aim

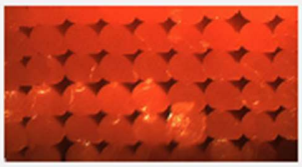
Comparative evaluation of mechanical characteristics of such thermoplastic polymers processed by FDM as PLA (several variants), PC, PA, ABS, TPU95A, PP, CPE, PET-G, PEI, and PEKK.



3D printing axes and Euler angles.

Density

- Technical Data Sheets (TDS)
- The filament density
- The density of extruded fibre
- Cube "production" density
- "True" density of the structure

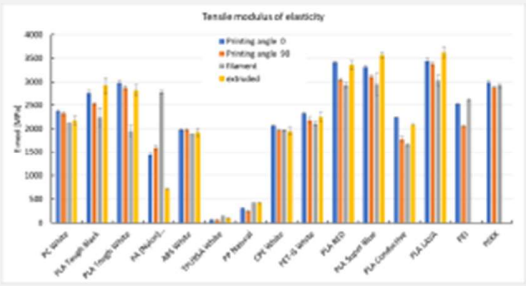


Typical sample cross-section image.

Cohesion/Adhesion

Adhesion/cohesion test hybrid samples.

Tensile modulus and strength



Experimental values of tensile modulus.

Reference:

Zīle, E., Zeleniakiene, D., Aniskevich, A., 'Characterization of polylactic acid parts produced using fused deposition modelling', *Mechanics of Composite Materials*, 2022, Vol. 58, No. 2, p. 169-180. https://doi.org/10.1007/s11029-022-10021-6 .

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