BIO-COMPOSITES REINFORCED WITH CORN INDUSTRY WASTE FOR 3D PRINTING APPLICATIONS

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FRAMEWORK AND OBJECTIVES

- Biobased polymers have been extensively studied over the last decade due to the need to reduce the carbon footprint [1-2].
- Biopolymers are often more expensive than conventional polymers and their properties can be significantly improved by the addition of biobased fillers.
- Waste for the corn industry - such as corncobs, husks, and stalks - can be used to enhance the mechanical and functional properties of biodegradable polymers, improving strength, thermal stability, and flexibility [3].

In this work the properties of biocomposites, their processing methods, and the challenges and opportunities associated with their application in 3D printing technologies are investigated.

Grinding of the corn cob and introducing it into in formulations with biopolymers in a 3D printing technology improves the physicochemical and mechanical properties of the polymers.

References

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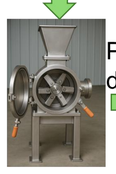
PROCESSING MATERIALS

1st Process

Corn Cob

grinding



Particles with different sizes

separation

Sizes

0 µm – 25 µm

25 µm – 45 µm

45 µm – 100 µm

100 µm – 150 µm

2sd Process

Biopolymer + corn cob

Mixer

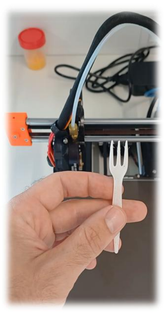
Micro-injector

3Devo Filament Maker

3rd Process

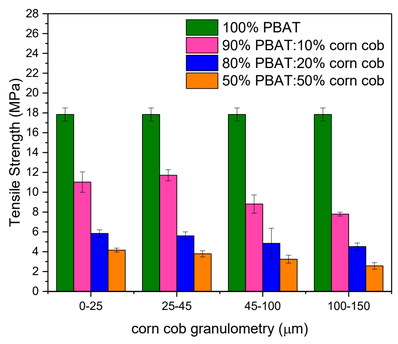
filaments

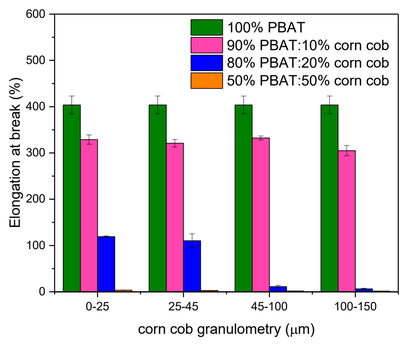
3D printing



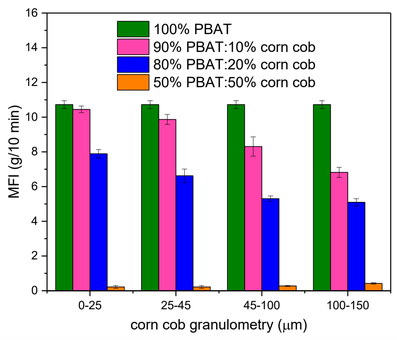
RESULTS

Mechanicals Results





MFI Results



Materials with reduced CO_2 footprint

Combination with **natural feedstocks** to prepare **biodegradable 3D printed parts.**

CONCLUSIONS

- Possibilitý of combination of **natural feedstocks with biopolymers** to prepare **biodegradable 3D printed parts.**
- Creation of material circularity by increasing the biodegradability of finished products.
- Reduction in the use of petroleum-derived materials.
- Reduction of the product's carbon footprint impacting everyday life.

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