



MECHANICAL CHARACTERISTICS ANALYSIS OF 3D PRINTING MATERIALS USED FOR INTEGRATION INTO FILTER MODULES

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ABSTRACT

In this study, the mechanical characteristics of a wide range of thermoplastics used in FDM 3D printing were tested. Our goal was to find a suitable material to be integrated into filtration modules. It is an innovative approach to enhance the hydrodynamics into the membrane separation modules which can result in better filtration efficiencies. Flexure, tensile and Charpy impact tests were carried out on the following plastics: high temperature PLA, ABS, CNT infused ABS (0.05%, 0.4%), PLA, PLA advanced pro, PETG, ASA, TPU. Our focus was on comparing the tensile and flexural strength, impact resistance and durability of these materials. TPU is an elastic plastic with exceptionally high impact resistance and flexibility but with minimal structural integrity, was excluded from the following results.

The impact test showed that PETG had the greatest impact resistance and all the different types of PLA were vulnerable due to the brittle nature of it. However, same materials from different manufacturers had drastically different impact resistance. The flexure and tensile tests revealed similar results. PLA withstood the most amount of force with the least amount of bend and strain before failure while ABS had greater flexibility but broke and tore apart under minimal load.

Keywords: Mechanical characteristics; 3D printing materials; Flexure, tensile and Charpy impact tests; Membrane Fouling Mitigation

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