**Development and Preliminary Analysis of 3D Printing Filament from Post-consumer Polypropylene**

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ABSTRACT

In recent years, a lot of attention has been directed toward the use of recycled materials in three-dimensional (3D) printing, driven by the need for better plastic waste management and sustainable practices. This study focuses on the development of sustainable post-consumer polypropylene (rPP) filaments for use in fused filament fabrication (FFF). The rPP were produced by blending injection-grade and extrusion-grade post-consumer polypropylene at various ratios. The influence of different grade ratios on filament diameter consistency and melt flow behavior was evaluated. The 50:50 ratio of injection-grade to extrusion grade rPP exhibited greater consistency in filament thickness compared to the 100% injection-grade and 60:40 ratios. Based on the melt flow rate (MFR) results, the MFR reduce when more extrusion grade rPP is added. In addition, the tensile properties of 3D printed parts made from rPP and commercial PP filaments were evaluated and compared. Overall, this research demonstrates the potential of upcycling waste materials into functional composite filaments for sustainable 3D printing applications.

Keywords: Post-consumer PP, fused filament fabrication, 3D filament, melt flow rate, tensile properties