Mechanical Properties of PETG vs. PHBHHx in Clear Aligner Application

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This study investigates the impact of environmental temperature changes on the mechanical properties of two plastic polymers: polyethylene terephthalate glycol (PETG) and poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBHHx). PETG is widely used in creating orthodontic aligners, but its disposal creates significant plastic waste and pollution. PHBHHx, on the other hand, shares similar characteristics with PETG but is biodegradable. The materials were subjected to long-wear simulations, cycling between hot and cold temperatures to replicate real-world conditions, such as the consumption of hot and cold foods and beverages. The Young's modulus and tensile strength of both materials were measured before and after heat treatment using the PASCO Comprehensive Materials Testing System, with results analyzed using PASCO Capstone software. The findings revealed that PHBHHx exhibited high heat resistance and consistent tensile strength after heat treatment, suggesting that PHBHHx is potentially viable as an environmentally friendly alternative to PETG.

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