Polypropylene and PETG 3D Printed Hybrid Structures

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Abstract: With the rise of 3-D polymer based printing, especially with the potential of the mass industrial utilization of the technology, there is a need for a better understanding for fabrication of hybrid structures utilizing the materials commonly used. To this end, using fused deposition modeling (FDM) 3D printing technique we fabricated Polypropylene (PP) and Polyethylene Terephthalate Glycol-modified (PETG) hybrid samples and analyzed their properties. The properties are directly related to the printing temperature, viscosity, and percentage within the print of the two components. Our studies confirmed that the hybrid samples have lower mechanical characteristics than the samples printed from either pure material. We associate the decrease in properties with adhesive issues at PP/PETG interface. To improve these properties, PP fiber was mixed with small amount of PETG to create diffusive bonding at the interface. Our approach is expected to be transferable to similar 3D printed polymer hybrid/composite systems that also face poor mechanical properties.