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C1Po2A-04 [21]: Ultimate Tensile Strengths of 3D Printed Carbon-fiber Reinforced Thermoplastics in Liquid Nitrogen

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3D printed composites have excellent potential to satisfy needs for lighter and more complex cryogenic materials for aerospace, medical, and other sectors. However, few material property measurements are available. To address this need, this work performs ultimate tensile strength testing of 3D printed thermoplastics immersed in liquid nitrogen at approximately 77 K. Materials tested include carbon-fiber reinforced PETG and carbon-fiber reinforced Amphora AM1800 filament. The carbon-fiber reinforced PETG increased in ultimate tensile strength and modulus of elasticity by 49% and 43.2% from room temperature tests, respectively. The carbon-fiber reinforced Amphora AM1800 filament decreased in ultimate tensile strength by 29.9% from room-temperature.

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