Developing and Evaluating Conductive Filaments for 3D Printing Applications

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The world of 3D printing has advanced rapidly, but the development of conductive filaments for use in electronics remains underexplored, offering significant room for innovation. To explore this, conductive filaments were created in varying concentrations of carbon black as follows; 5%, 10%, and 20% by weight. This was achieved by building a filament extruder that melts PLA pellets with carbon black to produce a filament that facilitates the flow of electricity. The product was used to 3D print test pieces and analyze their tensile strength and conductivity. The highest performing filament was used to create simple circuits that powered LEDs. The data demonstrates that while there was no significant difference between the average tensile strength in the 0% and 20% carbon black printed products, both were significantly stronger than the 10% carbon black printed product. In addition, there was a significant difference between the average conductivity of the 10% and 20% carbon black filaments and printed products. Finally, when attached to a power supply and used as a conductor, the 20% carbon black printed products conducted enough electricity to illuminate an LED. In conclusion, this experiment demonstrates that a DIY extruder can produce conductive filament for use in a 3D printer to create printed products that can conduct electricity.

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