DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

Department of Materials Science and Engineering

Master's Thesis Defense

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Evaluation of PLA-Based Spent Coffee Ground Composites as an Improved Plastic Material

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As a result of the exponential increase in plastic applications, an equally large amount of plastic waste is sent to landfills. Furthermore, the astronomical amount of food waste entering landfills each year does not quickly degrade as many would expect due to the anaerobic conditions that are experienced. In attempt to reduce the landfill's piles of these materials, spent coffee grounds (SCGs) were incorporated into poly(lactic) acid (PLA) with the hope to create a composite with an increased biodegradation rate. PLA was chosen due to its biodegradability and comparable properties to commonly used plastics, while SCGs are in abundant supply across the globe. This study characterizes and analyzes the processability of an extruded PLA-SCG composite. After many alterations to the composite's design, it was determined that a double-extruded formulation with 5% sifted ethanol-soaked SCGs holds the most promise for future studies. However, consistent SCG dispersion within the PLA matrix remains a challenge to be solved. Once successful, this composite could improve the biodegradation rate of PLA while introducing an innovative use for coffee waste.