The Novel Development of a Bio-Based Smart Material for Pharmaceutical Packaging and Temperature Insulation

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This research project aims to develop and test the efficacy of a chitin-based bioplastic. The goal is to create a biodegradable and temperature-insulating material that will replace the currently utilized primary packaging (like polyethylene) of prescription medications and other pharmaceuticals. Plastic waste and the resulting microplastics left behind are one of the leading causes of pollution and overall environmental damage. As the years pass, research has proven that this issue is harmful not only to the environment but to the health of humans as well. Furthermore, the overall cost involved in the delivery of pharmaceuticals has limited access to medications from those with the most need (the underrepresented and underprivileged). For this objective, chitin, derived from the exoskeletons of insects, shrimp, and the cell walls of certain fungi, was combined with cellulose, vinegar, and glycerol to create the bioplastic. Once the bioplastic recipe had been finalized, the bioplastic was soak-tested against different organics in liquid form and analyzed over time. Then the tensile strength of the original bioplastic and the soaked samples were measured through the use of a force sensor and graphical analysis. The plastic was found to be relatively unaffected by the organics and the original plastic had a tensile strength of about 5.360 Newtons (measured at the time it snapped). Biodegradability was also tested using compost in which multiple samples were left over a certain number of days. The final results of this portion of the experiment are inconclusive at this time.