An Approach to Reduce Microplastic Pollution Using Green Chemistry

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“Microfibers released during washing range from 124 to 308 mg per kg of washed fabric”(de Falco & Di Pace, 2019) The purpose of this project is to decrease the production of micro plastics by engineering an eco-friendly clothing polymer that reduces the release of microfibers from synthetic cloth. Through the use of a Vernier SpectroVis, the microplastics released by PolyCotton, PES(Polyester), and PVC(polyvinyl chloride) after wash cycles, were then analyzed. Demineralization, deproteinization, and deacetylation of crustacean shells was conducted in order to produce chitin to use as a biopolymer for the cloth. Through this, a catalyst of citric acid and sodium hypophosphite was used to activate the polymer to make it applicable to clothing. The synthetic cloth, PES, PVC, and Poly cotton had a high absorbance compared to the control, distilled water. An average absorbance of -0.22 was calculated in comparison between the three cloths. In accordance with the bio-polymer created, the synthetically polymerized, commercial PES cloth had a significant amount of microplastics detected. The cloth with the biopolymer had an average of -0.0533. Therefore, PES showed a high difference of microplastics between polymerized and commercial cloth. The polymer was successful and had a direct correlation with 100% PES cloth because it had a -0.06 percent decrease in microplastics. Therefore, meaning that the polymer created by researchers needs further studies and can be an efficient replacement for synthetic polymers.

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