Smart Biodegradable Plastic Capable of Delivering Diverse Antimicrobial Agents

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Plastic that is not degradable makes up a great percentage of waste produced each year. The purpose of this project is to design a bioplastic, with no harmful additives, that will degrade over time after its use. The plastic will also be able to release medication over time in order to have applications in the medical field. The bioplastic was made by emulsifying equal amounts of an ammonia alginate gel and a chloroform mixture and letting it sit for a day to dry in a beaker. The bioplastic was made with curcumin, a medicine that was chosen because it is known to have antibacterial and antifungal properties. The bioplastics were put on petri dishes that were streaked with two bacteria, Bacillus subtilis and Escherichia coli. The petri dishes were left to sit in an incubator and were then examined to see if a zone of inhibition had formed. The recipe for the bioplastic was formulated with the collaboration with a local Institute as well as through trial and error. Without the correct balance of the two components, the plastics would not solidify; small chunks of plastic would form in a pool of ammonia. The first hypothesis was partially supported as all of the bioplastics except four created a zone of inhibition when tested against the Escherichia coli and Bacillus subtilis. Twenty-seven of the forty-two t-tests ran were significant. The second hypothesis was accepted as the bioplastics were biodegradable after about a month.

Awards Won: