ENGINEERING PET-DEGRADING ENZYMES FOR BIORECYCLING AND BIOREMEDIATION

En Ze Linda Zhong, Department of Biology, Massachusetts Institute of Technology, USA
enzhong@mit.edu
Christopher A. Voigt, Department of Biological Engineering, Massachusetts Institute of Technology, USA
Anthony J. Sinskey, Department of Biology, Massachusetts Institute of Technology, USA

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Plastics, due to their inert properties and resistance to biodegradation, have been ravaging ecosystems worldwide and are especially harmful to aquatic wildlife. Plastics in the environment wear and tear into micron sized particles, termed microplastics, which are ingested and/or affect organisms at every level of the food chain. Recently, microplastics have been reported in human feces, and their potential health hazards remain unknown. In 2010, 4.8-12.7 million metric tons entered the oceans due to mismanagement and leakage, with an additional 31 million metric tons when terrestrial and freshwater ecosystems are considered. Both food and water supplies are likely contaminated with microplastics, and we need technologies to decrease formation of microplastics and remove these particulates from the environment. One of the most synthesized plastics is poly(ethylene terephthalate) (PET), an aromatic polyester with extremely low degradation rates. Due to the huge negative environmental impact of PET products, efficient recycling strategies need to be designed to "close the loop"' to reduce dependence on petroleum feedstocks and decrease economic loss through single-use practices. The recent discovery of a PET-consuming bacteria *Ideonella sakaiensis* and its PET hydrolases has shown potential for enzyme-mediated recycling and bioremediation. Here, we present preliminary characterization of the catalytic rate of the newly discovered PETase and its behaviour over time, with perspective into future engineering potential for the enzyme for use in industrial processes.