

Exploring the potential of enzymes for degrading plastic microfibers from clothing is crucial for tackling the growing problem of microplastic pollution. Synthetic fibers made of polyester, commonly used in textiles, release tiny plastic particles into the environment during washing. These microplastics can end up in water systems, where they accumulate and cause harm to ecosystems and potentially human health. Current plastic waste management methods, such as recycling, incineration, and landfilling, are often inefficient or environmentally harmful, making the search for more sustainable solutions critical.

A type of enzymes called polyesterases offer a promising, eco-friendly solution to this issue. These specialized enzymes have the potential to break down synthetic polymers into simpler, non-toxic components, reducing the environmental impact of plastic waste. However, identifying and optimizing enzymes with the right properties for this task is a very complex and time-consuming process.

To accelerate this discovery, we have developed a high-throughput microfluidic assay that enables the screening and isolation of polyesterase enzymes at a much faster rate than traditional methods. This innovative technique uses tiny water-in-oil droplets in which individual enzyme mutants are tested for their ability to degrade a molecule chemically close to polyester terephthalate. We can rapidly process thousands to millions of enzymes, allowing us to rapidly identify the most efficient ones. This approach not only saves time and resources but also opens the door to finding more efficient, stable, and robust enzymes that can operate in conditions found in wastewaters.