

Researchers develop solvent-free method to separate mixed plastics

JUNE 10, 2026

POLYMER SCIENCE



Mixed plastics packaging combines different plastics that are tightly bonded together, making them difficult to recycle using conventional methods

Researchers in Singapore have developed a solvent-free method to separate mixed plastics packaging by selectively breaking down one type of plastic while leaving others intact.

[Nanyang Technological University](#), working with the School of Materials Science and Engineering and the Nanyang Environment and Water Research Institute (NEWRI), has developed a process called depolymerisation-induced polymer separation.

Mixed plastics packaging combines different plastics that are tightly bonded together, making them difficult to recycle using conventional methods.

The process selectively breaks down PET while leaving PP intact, allowing the materials to separate and be recovered. The findings have been published in *Industrial & Engineering Chemistry Research*.

The mixed-plastics challenge

Professor Hu Xiao, programme director for sustainable chemistry and materials at NEWRI, said: "We're seeing more mixed plastics packaging used in everyday food products, but recycling it safely and efficiently is still a major challenge. Our team set out to tackle this by developing a practical, scalable way to separate these materials without using harmful solvents."

The method uses glycerol to break down PET into smaller molecules, which causes it to separate from PP. It operates at room pressure and does not require chemical solvents.

Dr Liang Yen Nan, senior research fellow at NEWRI and co-author of the study, said: "One of the biggest hurdles in plastics recycling today is the lack of a viable way to deal with mixed plastics. This project was driven by that challenge, and our goal is to help move the industry closer to a solution that works in the real world.

Tensile-strength properties

Tests showed recovered PP retained up to 90 per cent of its original tensile strength under optimal conditions.

The recovered PET cannot be reused directly in packaging but could be used in speciality materials or converted into monomers.

Kathirvel Periasamy, first author of the study, said: "Our process attempts to bridge the gap between laboratory research and industrial application. By simplifying separation and eliminating solvents, we aim to make plastics recycling more economically viable and environmentally sustainable."

The researchers said the approach could be adapted for other mixed plastics combinations and scaled using industrial extrusion equipment. They are now working with industry partners to test it at a larger scale.