

Researchers at the U.S. Department of Energy's (DOE) Institute for Cooperative Upcycling of Plastics (iCOUP) have developed a new method for recycling high-density polyethylene (HDPE).

Using a novel catalytic approach, scientists at DOE's Argonne National Laboratory and Cornell University converted post-consumer HDPE plastic into a fully recyclable and potentially biodegradable material with the same mechanical and thermal properties of the starting [single-use plastic](#). Their paper describing the results was published December 16 in the *Journal of the American Chemical Society*.

HDPE is ubiquitous in single-use applications because it is strong, flexible, long-lasting and inexpensive. But the ways we produce and dispose of HDPE pose serious threats to our own health and that of our planet.

Many HDPE products are produced from fossil fuels, and most post-consumer HDPE is either incinerated, dumped in landfills or lost in the environment. When it is recycled with current methods, the quality of the material degrades.

This new approach could reduce carbon emission and pollution associated with HDPE by using waste plastic as untapped feedstock and transforming it into a new material that can be recycled repeatedly without loss of quality.

Current HDPE [recycling](#) approaches yield materials with inferior properties. The team's alternative approach uses a series of catalysts to cleave the [polymer chains](#) into shorter pieces that contain reactive groups at the ends. The smaller pieces can then be put back together to form new products of equal value. The end groups have the added benefit of making the new plastic easier to decompose, both in the lab and in nature.

More information: Alejandra Arroyave et al, Catalytic Chemical Recycling of Post-Consumer Polyethylene, *Journal of the American Chemical Society* (2022). [DOI: 10.1021/jacs.2c11949](https://doi.org/10.1021/jacs.2c11949)

Provided by Argonne National Laboratory

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