

The most direct path to plastic upcycling is designing polymers specifically for reuse

December 1 2021



In a study, ORNL researchers concluded that the most direct path to plastic upcycling is through designing polymers specifically for reuse, which would allow the material to be converted into high-value products. Credit: Andy Sproles/ORNL, U.S. Dept. of Energy

Oak Ridge National Laboratory researchers determined that designing polymers specifically with upcycling in mind could reduce future plastic waste considerably and facilitate a circular economy where the material is used repeatedly.

Polymers, found in single-use plastic applications, contribute to landfill waste. One way to eliminate their disposal is through upcycling, which transforms plastics into high-value products. Conversion processes like pyrolysis and gasification make reuse possible. However, this can be costly because of the challenges associated with a plastic's composition, processing history and reaction temperature.

In a study, researchers concluded that while continuing to develop plastic recycling technologies remains critical for reuse, designing virgin polymers simplifies the upcycling process in the long term.

"Substances that stabilize polymers could be developed to minimize or even eliminate the need for presorting plastic mixtures," ORNL's Xianhui Zhao said. "This would allow for more widespread conversion at a much lower cost."

More information: Xianhui Zhao et al, Plastic waste upcycling toward a circular economy, *Chemical Engineering Journal* (2021). [DOI: 10.1016/j.cej.2021.131928](https://doi.org/10.1016/j.cej.2021.131928)

Provided by Oak Ridge National Laboratory

Citation: The most direct path to plastic upcycling is designing polymers specifically for reuse (2021, December 1) retrieved 28 April 2024 from <https://phys.org/news/2021-12-path-plastic-upcycling-polymers-specifically.html>

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