

# Scientists make plastic more degradable under UV light

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Many plastics that are labeled as biodegradable are only compostable under industrial conditions, but scientists at the University of Bath have now found a way to make plastics break down using only UV light.

As a result of increasing [public concern](#) over plastic waste, PLA (Polylactic acid), created using [lactic acid](#) from the fermentation of sugars, is now widely used as a renewable, sustainable alternative to plastics derived from crude oil products—used in everything from disposable cups and teabags to 3D printing and packaging.

It is often labeled as biodegradable, however it has limited degradability in [natural environments](#), for example in soil or in seawater, and it only degrades under industrial composting conditions of high temperatures and humidity—not achievable in domestic compost heaps.

Now scientists at the Centre for Sustainable and Circular Technologies (CSCT) at the University of Bath have developed a way that could make these plastics more degradable in the natural environment.

The team found that they can tweak the degradability of the plastic by incorporating different amounts of sugar molecules into the polymer.

They found that incorporating as little as three percent sugar polymer units into PLA led to 40% degradation within six hours of exposure to UV light.

Most promisingly, the technology is compatible with existing plastic manufacturing processes, meaning it could potentially be tested and adopted quickly by the plastics industry.

Publishing in *Chemical Communications*, the researchers hope their findings will be used in the future by the [plastics industry](#) to help make [plastic waste](#) more degradable at the end of the life of the product.

Dr. Antoine Buchard, Royal Society University Research Fellow and Reader in Polymer Chemistry from the CSCT, led the research, which was supported by the Royal Society.

He says that "lots of plastics are labeled as biodegradable, but unfortunately this is only true if you dispose of it in an industrial waste composter—if put into domestic compost heaps, it can last for years.

"Most PLA plastics are made up of long [polymer chains](#) which can be difficult for water and enzymes to break down. Our research adds sugars into the polymer chains, linking everything together by bonds that can be broken using UV light.

"This weakens the plastic, breaking it down into smaller polymer chains that are then more sensitive to hydrolysis.

"This could make the plastic much more biodegradable in the natural environment, for example in in the ocean or in a garden compost heap.

"Previously scientists have looked at enhancing the degradability of PLA to water—hydrolysis—but this is the first time anyone has looked at using light.

"This strategy remains to be translated to real-life plastics objects and tested with sunlight, but we hope our technology could be used in the future to make [plastics](#) that are strong when you're using them, but can break down easily when reuse and recycling are not possible anymore."

**More information:** Craig Hardy et al, UV degradation of poly(lactic acid) materials through copolymerisation with a sugar-derived cyclic xanthate, *Chemical Communications* (2022). [DOI: 10.1039/D2CC01322C](#)

Provided by University of Bath

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