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Plastic wrapper today, fuel tomorrow

A chemistry professor in the US has developed a 'fuel-latent plastic' that can easily be turned into a substitute diesel fuel

Matthew Wald.
Washington

Potent plastic

Richard Gross has developed fuel-latent plastic—which can be used like ordinary plastic, for packaging or other purposes, but when it is waste, can easily be turned into a substitute diesel fuel.

Gross is turning plant oils, of the kind already used to make biodiesel, into 'bioplastic.' The plastics can be films or rigid, as are commonly found in food packaging. Then he uses a naturally occurring enzyme to break down the plastic into fuel.

Conversion begins with shredding the plastic using an office paper shredder. Then the shreds are immersed in water with a small amount of the enzyme. In three to five days, the process is complete, and the biodiesel floats to the top.

The plastic fuel has impressed the Pentagon which has given $2.34 million for more research. The technique could reduce the amount of material that the US military has to ship to remote bases.

Scientists worldwide are struggling to make motor fuel from waste, but Richard Gross has taken an unusual approach: making a "fuel-latent plastic," designed for conversion. It can be used like ordinary plastic, for packaging or other purposes, but when it is waste, can easily be turned into a substitute diesel fuel.

The process does not yet work well enough to be commercial, but the Pentagon was impressed enough to give $2.34 million for more research.

The technique could reduce the amount of material that the military has to ship to soldiers at remote bases, because the plastic would do double duty, first as packaging and then as fuel. It would also reduce trash disposal problems, according to the Defense Advanced Projects Research Agency, known as DARPA.

Gross, a professor of chemistry at Polytechnic University in Brooklyn, is turning plant oils, of the kind already used to make biodiesel, into "bioplastic." The plastics can be films or rigid, as are commonly found in food packaging. Then he uses a naturally occurring enzyme to break down the plastic into fuel.

"It works in very mild conditions, lukewarm tap water," he said. The enzyme, cutinase, is present in nature, made by parasites to eat through the shiny surfaces of tree leaves, so the parasite can suck nutrients out of the inner parts.

A gene-splicing company, DNA 2.0, has taken some of the DNA from that parasite and spliced it into an e. coli bacterium, to mass produce the enzyme. The e. coli was chosen because it reproduces more readily than the original parasite.

Conversion begins with shredding the plastic. An office paper shredder will do, Gross said. Then the shreds are immersed in water with a small amount of the enzyme. In three to five days, the process is complete, and the biodiesel floats to the top.

To meet Environmental Protection Agency standards for road use in the United States, biofuel would have to go through additional chemical processing, but DARPA believes the resulting fuel can be poured directly into the fuel tank of a diesel generator to make electricity.

A soldier generates on average more than seven pounds of packaging waste a day, according to DARPA, and simply getting rid of the trash requires "personnel, fuel and critical transport equipment." Even if some of the energy was lost in reprocessing the plastics, the waste could provide more than enough fuel to make the electricity that a military base would need, accord ing to DARPA

Richard Gross at Polytechnic University in the borough of Brooklyn, New York. Gross is holding bioplastic, **(left)**, which is made from vegetable oils –Hiroko Masuike. NYT