

Microbes convert 'Styrofoam' into biodegradable plastic

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Bacteria could help transform a key component of disposable cups, plates and utensils into a useful eco-friendly plastic, significantly reducing the environmental impact of this ubiquitous, but difficult-to-recycle waste stream, according to a study scheduled to appear in the April 1 issue of the American Chemical Society journal, *Environmental Science & Technology*.

The microbes, a special strain of the soil bacterium *Pseudomonas putida*, converted polystyrene foam — commonly known as Styrofoam™ — into a biodegradable plastic, according to Kevin O'Connor, Ph.D., of University College Dublin, the study's corresponding author. The study is among the first to investigate the possibility of converting a petroleum-based plastic waste into a reusable biodegradable form.

O'Connor and his colleagues from Ireland and Germany, utilized pyrolysis, a process that transforms materials by heating them in the absence of oxygen, to convert polystyrene — the key component of many disposable products — into styrene oil. The researchers then supplied this oil to *P. putida*, a bacterium that can feed on styrene, which converted the oil into a biodegradable plastic known as PHA (polyhydroxyalkanoates). The process might also be used to convert other types of discarded plastics into PHA, according to O'Connor.

PHA has numerous uses in medicine and can be used to make plastic kitchenware, packaging film and other disposable items. The biodegradable plastic is resistant to hot liquids, greases and oils, and can

have a long shelf life. But unlike polystyrene, it readily breaks down in soil, water, septic systems and backyard composts.

Worldwide, more than 14 million metric tons of polystyrene are produced annually, according to the U.S. Environmental Protection Agency. Most of this ends up in landfills. Although polystyrene represents less than 1 percent of solid waste generated in the United States, at least 2.3 million tons of it is dumped in U.S. landfills each year. Only 1 percent of polystyrene waste is currently recycled, the authors note.

Source: American Chemical Society

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