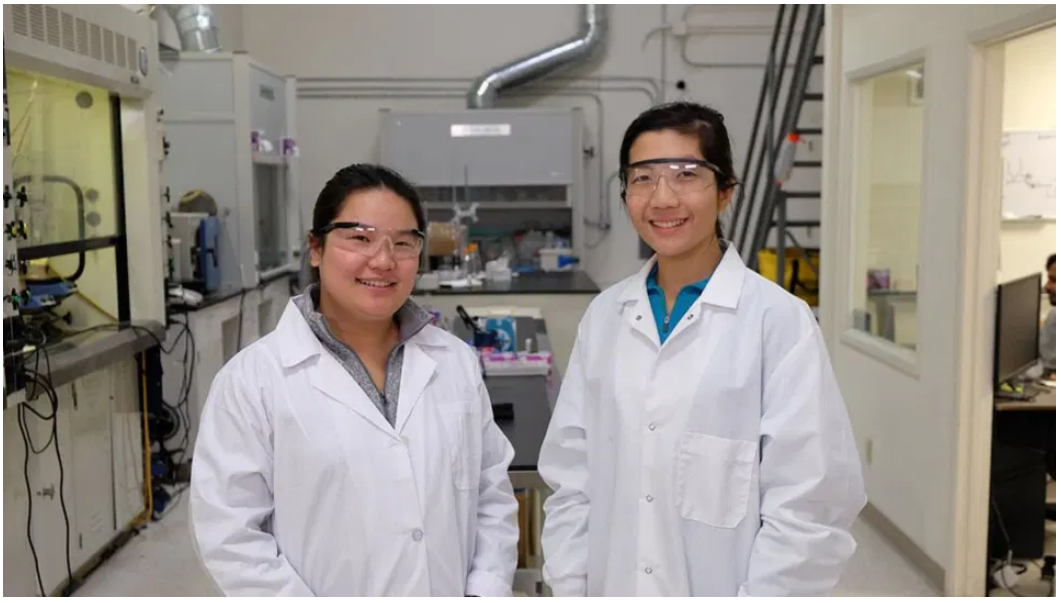




# Students Develop Process To Recycle The Most Common Single-use Plastic: Polyethylene

by Andrea D. Steffen June 26, 2019



Most of our plastic products are either hidden away in a landfill or floating somewhere in the oceans, despite our efforts to recycle. Nearly every bit of it that has ever been created is still somewhere in the world due to plastics inability to naturally degrade. And since we use plastic for pretty much everything nowadays, there is quite a lot of it out there!

This plastic pollution is most problematic in the oceans as it is constantly killing off fish and other creatures that are vital to the ecosystem. Seeing as all the plastic isn't going anywhere soon (and we can't stop making it), the only real option is to find a successful system that can battle the rampant pollution before it overwhelms our marine environments. This is exactly the challenge two students, Miranda Wang and Jeanny Yao, tackled which led them to the solution of optimizing a strain of plastic-eating bacteria.

Miranda Wang said:

> *It is practically impossible to make people stop using plastic, we need technology to break the material, and everything becomes biodegradable.*

Wang and Yao attended the Magee Secondary School in Vancouver, Canada together before heading to separate universities. Together, they developed a process that uses a solvent that first dissolves plastics then breaks them down further with enzymes. The compounds that are left can be easily digested by bacteria. The bacteria to carry out this task was developed to specifically eats phthalates, prominent chemicals in plastic. Most polyethylene, like bubble wrap and plastic bags, end up in landfills.

The pair accomplished this in their senior year of high school by analyzing bacteria found in a river near their homes. Yao said at their first TED Talk in 2013:

> *Although we're not the first ones to find that bacteria can break down phthalates, we were the first ones to look into our local river and find a possible solution to a local problem. We have not only shown that bacteria can be the solution to plastic pollution, but that also being open to uncertain outcomes and taking risks create opportunities for unexpected discoveries.*

Here's their second "update version" TED talk:

They have already won 5 prizes thanks to this project. They became popular quickly because they were the youngest to win the Perlman science prize. Since then, they founded BioCellection, a company that focuses on recycling polyethylene (the most common but least recyclable type of plastic). However, at the end of the day, the system was not feasible using microbes and they turned to chemistry – just another means to the same end.

Wang said after receiving the Pritzker award:

> *This technology can become the pillar of what would enable people around the world to mine landfills for plastics as a new carbon source. We don't have to drill for oil anymore to make the things around us.*

More than 220 million tons of plastic is produced around the world every year, according to UNESCO, and BioCellection says more than 80% of that is not recycled. "Our world is so advanced," Yao said. "But when it comes to plastic recycling it's so primitive." Around 18 billion pounds of the plastic produced yearly ends up in oceans. The Ellen MacArthur Foundation predicted last year that plastic would outweigh fish in oceans by 2050. BioCellection takes polyethylene and turns them into chemical building blocks for new products so they don't end up in the oceans.

Yao said:

> *I think it's such a waste when materials that are perfectly good to be reused or repurposed end up as pollution.*

## The Process

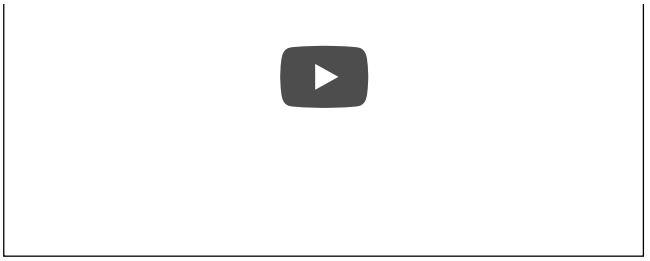
- First, chemists wash the plastic film to remove contaminants and then shred it into strips.
- Then the strips are fed into a reactor that uses heat, chemicals, and motion to break down the plastic film into other chemicals.
- The chemicals brew then undergo several rounds of stirring, heating, cooling, and evaporation to remove impurities.
- This concentrates the chemicals into an unrefined product that looks golden or rust-colored because of impurities.
- That product is then refined into chemical building blocks, which look like white powder and are worth anywhere from $1,600 to $21,000 per metric ton.

## Pilot Program

Their pilot program with San Jose's recycling facility is now in the final development phase. At the moment, BioCellection's team is adjusting the process to handle polyethylene that has been contaminated with dirt or food residue. The company is also trying to scale up its lab's operation. If BioCellection can successfully scale up its operation, GreenWaste hopes to have BioCellection build a chemical processing facility at one of GreenWaste's Bay Area sites. "The long-term goal is to be able to recycle all of the city of San Jose's — and other cities' — polyethylene plastic," said Wang.

To move toward San Jose's long-term goal of producing "zero waste," city officials say they're "always looking for better ways to boost recycling through incentive programs, educational campaigns and public-private partnerships." Projects like this one represent the "spirited innovation that's the heart of Silicon Valley," said Kerrie Romanow, San Jose city's chief sustainability officer and director of environmental services.

San Jose startup finds new way to recycle plastic



You can support BioCellection by donating or investing in the company by clicking here and by letting people know about their innovative technology.

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I use the alphabet to paint words that become a beautiful and inspiring image in the reader's mind. I have a Bachelors in Architecture from FAU.


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