Meet a Scientist: Stephanie Liffland, Polymer Chemist, University of Minnesota

Through her interest in cooking, Stephanie discovered a love for chemistry that she now uses to find new ways of making plastics sustainable and biodegradable. In her work, she explores ways to make plastic from plants.

This is a transcript of the "Meet a Scientist:Stephanie Liffland, Polymer Chemist" video, part of the 4-H STEM curriculum: Sustainable Polymers-Plastics of the Future for a Green,Clean World (Find the video and curriculum at: www.4hpolymers.org).

Hi, I'm Stephanie Liffland. I am originally from New Jersey, but I am a graduate student here at the University of Minnesota, and I work in the chemistry department. I work in something called the Center for Sustainable Polymers, and it sounds really fancy, but a polymer is just a really big molecule that's made out of a lot of little smaller molecules. Common polymers that you might know are plastics: plastic water bottles, your Tupperware containers, the plastic in your toothbrush, the plastic in your shoes - things that you use every day. What I do is I try to make those plastics out of plants in a way that's something we call sustainable. So they're not made out of oil (which isn't good because those things don't degrade in the environment and they contribute a lot to plastic waste). Rather, we want to make them out of plants like corn.

What is your research?
I make something called triblock copolymers, and so it's a polymer that if you looked at it, it's got one block of something like an A unit, a B block in the middle, and then another A block at the end, so it's an A, a B, and an A. And so the amount of A that you have can really affect the

overall properties that you get. What I wanted to do was understand how, if I add more or less of the A on the ends, will that change the properties that my material has? So I synthesized a lot of different polymers that had different amounts of A, and then tested them to see how stretchy they were, how long it took for them to break when you pulled on them, as well as how high you could heat them before they started to degrade. And this was to try to make polymers that you could use on a day-to-day basis.

Why is your research important?
We use plastic packaging and then you throw it away and then where does it go from there? Not everything can be recycled, and a lot of things that are meant to be recycled are actually contaminated and can't, in fact, be recycled. Also, a lot of those plastic packagings, they're made from things like oil and so the goal of our work is to make them out of things like plants, so that when you do throw them away after you use them they won't harm anything. They'll just go back into the environment and be safe for everybody and everything in it.

What are the skills of a scientist?
Something that teachers really focus on is critical thinking and that's something that's important for being a scientist, because you have to kind of think about what you're doing in the experiments that you want to run. We read a lot and think about things a lot, but it's also a lot of fun activities: setting up your own experiments, and analyzing the polymers that you end up making in different ways.

How did you decide to be a scientist?
A lot of kids think that they aren't good at math, or aren't good at science, and I think it's just finding what you like. I really liked to cook when I was little and I really liked the idea and the act of mixing things together and making something new, and so chemistry was really fun and

interesting to me because you got to mix different chemicals together to make something new. It's a lot like cooking, so if you like cooking you might like chemistry too.