Video: Bio-inspired surfactants could 'green' many common household products

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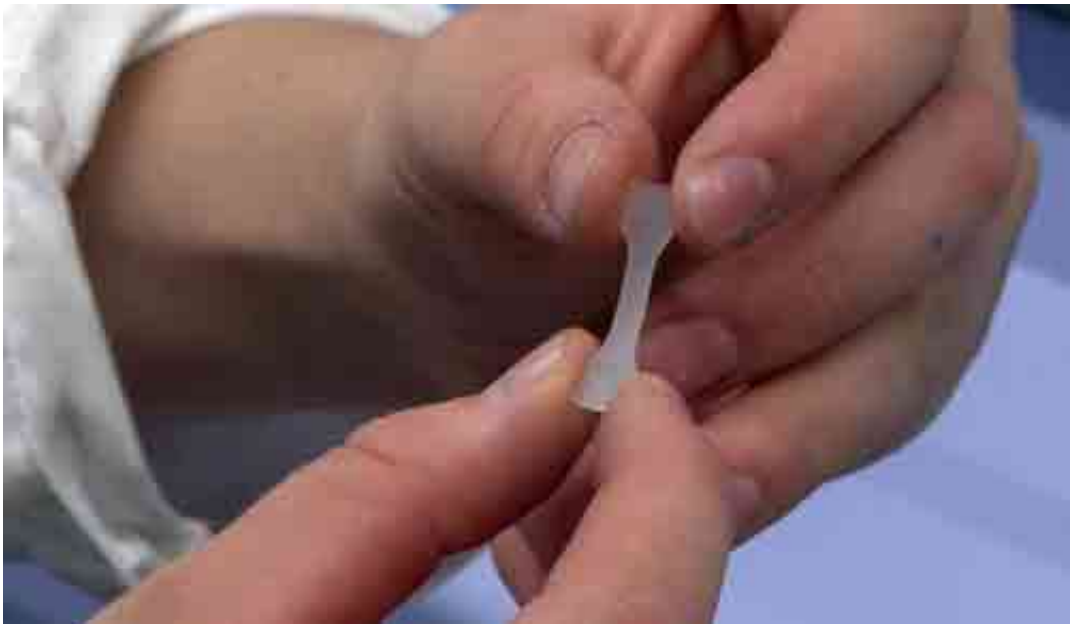

Plastics are a miracle of modern science and are now fundamental to our everyday lives. Of course, they are also a constant reminder of our throwaway society. With support from NSF, chemist Marc Hillmyer of the University of Minnesota and a team at the Center for Sustainable Polymers (CSP) are dedicating their research to transforming the way plastics, or "polymers," are made and unmade. The center's vision is to design, demonstrate, and develop economically competitive and environmentally friendly polymers that may even outperform their traditional counterparts. To accomplish the goal, these chemists are working on new strategies using renewable feedstock chemicals, such as sugars, plant oils and other naturally sourced starting materials. Find out more in this Science Nation video. Credit: Science Nation, National Science Foundation

From cleaning supplies to pharmaceuticals, surfactants are the compounds that make your soap bubbly, your paint spread smoothly and your medication dissolve more easily. Surfactants can be found everywhere because of their unique dispersion ability that helps lower the repulsive forces between liquids and solids or two non-mixing liquids (think oil and water).

Most surfactants are currently made from non-renewable petroleum sources and many of these surfactants don't breakdown easily after they are discarded. Some can persist in the environment for decades. Their widespread use and environmental persistence has raised concerns about toxicity.

At the University of Arizona, Jeanne Pemberton and her cross-disciplinary team work to create new "green" surfactants based on sugars that are generally known as glycolipids. With support from the National Science Foundation (NSF), Pemberton and her team are exploring the recent discovery of a versatile synthesis that allows production of many different types of glycolipids in large quantities. Some of these glycolipids are modeled after naturally occurring biosurfactants and some can be produced relatively inexpensively using renewable natural resources. Through computational methods, the team determines which glycolipids might have the most fitting surfactant properties as targets for synthesis and testing.

Aside from potentially benefitting the environment and the economy, this project serves as a platform for the cross-disciplinary training of various types of researchers. These researchers include current postdoctoral researchers and graduate students, some of whom are participating in internships at the National Institute for Standards and Technology, as well as high school students and teachers engaging in green chemistry research and progressive green chemistry classroom curricula.

With support from NSF, Doug Keszler, director at the Center for Sustainable Materials Chemistry (CSMC), and his team in the College of Science at Oregon State University are developing the next generation of electronic circuits, starting with the basic computer chip. In the manufacturing process, they want to replace bulky carbon compounds with metal oxides in order to put more transistors onto a chip. The new process would be cleaner, faster and cheaper. The CSMC's specific focus is to conduct curiosity-driven and use-inspired research to enhance the sustainable chemistry toolbox with new methods and new techniques that will advance the scientific enterprise and transform the next generation of products, while preparing students to become the next generation of green chemists. Find out more in this Science Nation video. Credit: Science Nation, National Science Foundation

Provided by National Science Foundation

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