

Iowa State researchers looking for catalyst that allows plants to produce hydrocarbons

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Iowa State University researchers, left to right, Basil Nikolau and Jackie Shanks are working to develop new biological sources of petroleum for your car. Photo by Bob Elbert.

Plants and algae may be a source of green, renewable hydrocarbons that could replace the ancient, finite hydrocarbons in fossil fuels, according to a team of researchers led by Iowa State University's Jackie Shanks.

Shanks, Iowa State's Manley R. Hoppe Professor of Chemical Engineering, said some plants and algae produce hydrocarbons as a way to store carbon and energy. And those hydrocarbons could be used to create second-generation biofuels.

"These plants are capturing [solar energy](#) and creating something that's

chemically identical to petroleum," Shanks said.

But, she said, researchers don't know the exact structures, mechanisms, genetics and metabolism of that conversion.

Shanks and a team of researchers recently won a four-year, \$2 million grant from the National Science Foundation's Office of Emerging Frontiers in Research and Innovation to study the production of biological hydrocarbons.

The research team includes Basil Nikolau, Iowa State's Frances M. Craig Professor in the departments of biochemistry, biophysics and molecular biology and food science and human nutrition, who's also the deputy director of the NSF Engineering Research Center for Biorenewable Chemicals based at Iowa State; Thomas Bobik, an Iowa State associate professor of biochemistry, biophysics and [molecular biology](#); Gordon Wolfe, an associate professor of biological sciences at California State University, Chico; and Govind Nadathur, a professor of marine sciences at the University of Puerto Rico. The project will also support the research, training and education of a number of post-doctoral researchers, graduate students and undergraduate students at Iowa State and the other universities. And it will provide these young researchers with an opportunity to broaden their training experience with national and international collaborations.

Shanks said the researchers' specific task is to isolate, characterize and bioengineer a catalyst that creates the biological hydrocarbons.

Nikolau said the current project will not address which plants or algae are the best producers of biological hydrocarbons or how the biological process can best be exploited. He said those studies would build on the discoveries of the current project.

But can plants directly produce hydrocarbons for biofuels? Is that too good to be true?

Shanks said the research could lead to technologies that transform how liquid fuels are produced.

And that's the kind of project the science foundation's Office of Emerging Frontiers in Research and Innovation is supporting.

According to the foundation, the office's goal is to support "transformative opportunities potentially leading to: new research areas ...; new industries or capabilities that result in a leadership position for the country; and/or significant progress on a recognized national need or grand challenge."

A new, sustainable source of hydrocarbons could lead to all of that: "The production of renewable hydrocarbons that would integrate directly into the existing fossil-carbon infrastructure would represent an important advance in biofuels technology," the researchers wrote in their project proposal. "Transforming this existing industry to a bio-based carbon feed-source is a grand challenge that will need to integrate unique and proficient biological solutions with new engineering efficiencies."

Provided by Iowa State University ([news](#) : [web](#))

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