

Researchers Developing More Efficient Ethanol Production Method

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A University of Wyoming professor has received a \$485,000 grant to explore a more economical way to produce ethanol.

Patrick Johnson, assistant professor in the UW College of Engineering and Applied Science Department of Chemical and Petroleum Engineering, received the four-year grant from the U.S. Department of Transportation with \$50,000 in matching funds from the UW School of Energy Resources. The grant is through the 2007 North Central Sun Grant Regional Competitive Grant Program.

"Ethanol is gaining widespread attention as an alternative transportation fuel to reduce foreign dependence on oil and to mitigate total carbon emissions," he says. "However, major technological advances are necessary to achieve economical, large-scale production from biomass. This project seeks to improve the efficiency of the conversion of cellulosic biomass into ethanol."

The project involves developing recyclable biocatalysts for use in the process that converts cellulose into fermentable sugars for ethanol production.

"When producing ethanol from biomass, enzymes are approximately 40 percent of the total production cost," Johnson says. "So by recycling the enzymes that convert cellulose into sugars, the costs might be lowered."

Researchers will fabricate enzyme nanoparticles with a magnetic core

along with enzymes immobilized on stimuli-responsive polymers -- substances composed of molecules with large molecular mass. Well known examples of polymers include plastics, DNA and proteins. Johnson explains that stimuli responsiveness allows the researchers to make polymers that will precipitate out of solution with a slight change in pH (a measure of acidity or alkalinity in a solution) or temperature.

"Responsive polymers can be precipitated out of solution after the reaction, again for recycling," Johnson says.

The project's other principal researchers are Youqing Shen, associate professor with the UW Department of Chemical and Petroleum Engineering, and Song Jin, scientist with the Western Research Institute at UW.

Source: University of Wyoming

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