

# LSU professors work to improve efficiency of ethanol fuel

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Lowering fuel emission levels is a topic facing constant scrutiny by the global public. Rising gas costs, environmental concerns and conflicts in oil-producing areas have made consumers, corporations and researchers more than curious about the potential of alternative, or “green,” fuels, such as ethanol.

James Spivey, McLaurin Shivers professor of chemical engineering at LSU, and Challa Kumar, group leader of nanofabrication at LSU’s Center for Advanced Microstructures and Devices, or CAMD, are working diligently with partners from across the nation to make ethanol fuel an efficient reality.

Together with Clemson University and Oak Ridge National Laboratories, the researchers received \$2.9 million in funding from the U.S. Department of Energy, or DOE, and its cost-sharing partner, Conoco-Phillips, the third-largest integrated energy company in the nation.

“We’re working with our project partners to produce ethanol from a coal-derived syngas, a mixture of primarily carbon monoxide and hydrogen. The United States has tremendous reserves of coal, but converting it to affordable, clean fuels is a challenge – one that we are addressing in this DOE-funded project,” said Spivey. “Because ethanol is a liquid, it can be more easily distributed to the end user than gaseous hydrogen. It can be converted into a hydrogen-rich gas at the point of use, such as a fuel cell. The net result is clean energy produced from a domestic resource.”

James Goodwin, chairman of the chemical and biomolecular engineering department at Clemson, and David Bruce, associate professor of chemical and biomolecular engineering at Clemson, are using advanced computational methods to identify new catalysts and test them with techniques such as isotopic labeling.

LSU doctoral students Femi Egbebi and Nachal Subramanian are carrying out research with Spivey in the preparation and testing of these catalysts, determining which ones produce the desired results.

Steve Overbury and Viviane Schwarz at the Oak Ridge National Laboratory will test new catalysts with their specialized equipment while Joe Allison and Vis Viswanathan at Conoco-Phillips will analyze the costs and commercial potential of the overall process.

Kumar is in charge of designing and synthesizing novel nano-structured catalysts using wet-chemical synthesis capabilities available at CAMD in addition to utilizing synchrotron radiation-based X-ray absorption spectroscopy tools. Nanomaterials having unique core-shell architecture that are currently under development at CAMD are anticipated to enhance ethanol production significantly.

“It is CAMD’s vision to be in the forefront of development of nanomaterials for a broad range of applications ranging from catalysis to medical diagnosis and therapy,” said Kumar.

“The DOE is definitely interested in seeing a commercial project come out of this,” said Spivey. “Our project team is committed to making this happen. A successful project will help show that LSU is focused on research that makes sense for the environment and for our country.”

Source: Louisiana State University

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