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Media Relations
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**NSF Grants of $947,000 Help UNH Professor Boost Ethanol Efficiency**

DURHAM, N.H. – Xiaowei Teng, assistant professor of chemical engineering at the University of New Hampshire, has received two National Science Foundation grants totaling nearly $1 million to improve the efficiency of ethanol oxidation fuel cell reactions.

“With these grants, we’re trying to promote ethanol as a future renewable fuel in the power generation industry,” says Teng. “Our research tries to target the most efficient way to burn it.”

Fuel cells, far more efficient than internal combustion engines, are emerging as a way to generate electricity from chemical energy; they are much like batteries in their function. Ethanol, which has been added to gasoline for use in autos, is at least four times more efficient in fuel cell reactions than in internal combustion engines. While hydrogen is the best-studied fuel in fuel cell reactions, ethanol presents several advantages.

“It’s less toxic compared to other fuels, and it can be obtained from a renewable process,” says Teng, adding that it can be derived not only from corn but also from non-sugar sources such as grasses and stalks.

Ethanol is hampered, however, by a slow, inefficient, and expensive oxidation process in the fuel cell reactions. With these two grants, each for three years, Teng and his colleagues will seek to improve that process. With the first grant, $375,000 funded by the Chemical Catalysis Program at NSF, Teng and co-principal investigator Nathaniel Deskins of Worcester Polytechnic Institute will develop and investigate a new class of palladium-based catalysts for efficient oxidation of ethanol in an alkaline medium via so-called alkaline fuel cell (AFC) reactions.

The second grant, $572,802 from NSF’s Catalysis and Biocatalysis Program, will fund the development of a new class of catalysts for ethanol oxidation that replace the currently used platinum-based catalysts, which are extremely expensive and less efficient, in proton exchange membrane fuel cell (PEMPC) reactions. Working with Deskins and Anatoly Frenkel from Yeshiva University, Teng will explore the use of catalysts based in iridium, which has a much lower price and higher reactivity than platinum in oxidizing ethanol molecules into carbon dioxide and water.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state’s flagship public institution, enrolling 12,200 undergraduate and 2,300 graduate students.