Hydrogen-powered lawnmowers?

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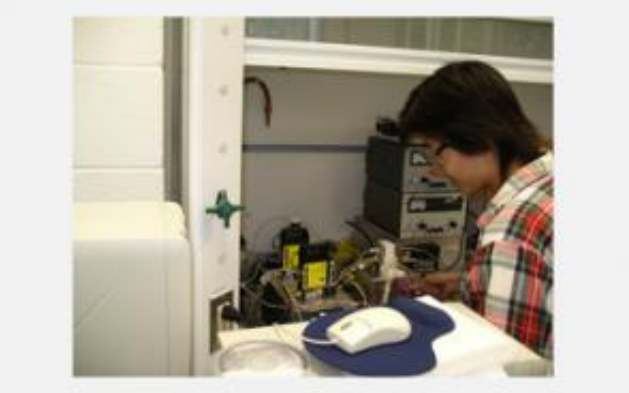

Princeton student Claire Woo, a recipient of the NSF Research Experiences for Undergraduates award, at work in the laboratory of Jay Benziger. Credit: Princeton University

In a breakthrough that could make fuel cells practical for such small machines as lawnmowers and chainsaws, researchers have developed a new mechanism to efficiently control hydrogen fuel cell power.

Many standard fuel cell designs use electronics to control power output, but such designs require complex systems to manage humidity and fuel recovery and recycling systems to achieve acceptable efficiency.

The new process controls the hydrogen feed to match the required power output, just as one controls the feed of gasoline into an internal combustion engine. The system functions as a closed system that uses the waste water to regulate the size of the reaction chamber, the site where the gasses combine to form water, heat and electricity.

National Science Foundation (NSF) awardee Jay Benziger of Princeton University developed the new technique with his student Claire Woo, a recipient of an NSF Research Experiences for Undergraduates award and now a doctoral candidate at the University of California, Berkeley. Woo and Benziger published their findings in the February 2007 *Chemical Engineering Science*, now available online.

The researchers believe the first applications for their technology will be in smaller engines. Fuel cells are currently inefficient on such scales due to the need for fuel recycling and excess hydrogen in standard designs. The researchers' new design is closed, so 100 percent of the fuel is used and there is no need for a costly fuel recycling system.

"The system is ideal for small internal combustion engines that lack emissions controls and are highly polluting," said Benziger. "There is also no need for an extensive hydrogen distribution system for these small motors; the hydrogen could be supplied in returnable tanks such as the propane tanks used for gas grills."

Benziger's next goal is to connect several of the new fuel cells together to increase power, a system that could potentially compete with cells now being tested in the automotive industry.

Source: National Science Foundation