

SUMMER 2009

# OHIO TODAY

FOR ALUMNI AND FRIENDS OF OHIO UNIVERSITY

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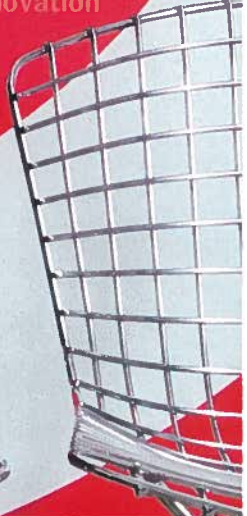
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## THE BIG IDEA

Celebrating innovation at Ohio



# Q: What's smelly but can fuel a car?

Driving home from a seminar on fuel cell technology, Gerardine Botte was struck with a notion.

Her idea was based on water electrolysis, a process used to produce hydrogen energy from water. Botte, an associate professor of chemical and biomolecular engineering in the Russ College of Engineering and Technology, took the concept to the next level: Instead of clean water, what if it were possible to use wastewater? "You could remove the ammonia from wastewater, convert it to hydrogen energy, and it would be better, because you'd be remediating and producing clean energy," says Botte.

What resulted was a first-of-its-kind fuel cell technology, known as the "ammonia electrolytic cell," that allows hydrogen to be produced on demand. It's an efficient and environmentally sound process; compared to water electrolysis, ammonia electrolysis consumes 95 percent less energy and produces more hydrogen.

The ammonia itself comes from a renewable supply. Botte estimates more than 5 million tons of ammonia enter the waste stream as human and animal urine each year in the United States.

If it seems like an unlikely fuel source, Botte will do her best to convince you otherwise. "I think ammonia is our future fuel," she says. "It's green, renewable, and we know how to transport it and work with it."

Since its inception, Botte's idea of ammonia electrolysis has blossomed into several projects. At Ohio University, she enlists the help of five graduate students who each cover specific branches of ammonia electrolysis research, including potential automobile and residential applications.

In November, Botte's Electrochemical Engineering Research Laboratory received a \$2.23 million federal grant to adapt the concept for military use. Under the "Silent Camp Initiative," she'll work with the U.S. Army Engineer Research and Development Center's Construction, Engineering Research Laboratory to provide backup power for training facilities and soldier camps at night. The system could cut long-term costs for fuel and decrease susceptibility to attacks against fuel supply lines.

If successful, there could be promising potential for the commercialization of the ammonia electrolytic cell.

Botte takes pride in the fact that the cell had its beginnings at Ohio University. "It was born here and is unique to this university," she says.

— *Samantha Kinhan*

## Q: HOW DO YOU STOP A BULLY?

Bullies who taunt not on the playground but through the use of technology are the research focus of Christine Suniti Bhat, assistant professor of counselor education. Few studies have targeted these "cyberbullies," who might use text messaging, instant messaging or e-mail to harass peers. Bhat has presented internationally on the topic and specializes in education efforts for counselors and parents who can prevent bullying or aid a victim.

## Q: CAN WE TARGET CANCER MORE EFFECTIVELY?

A new class of compounds called phosphaplatins can effectively kill ovarian, testicular, head and neck, and other cancer cells with potentially less toxicity than conventional drugs, according to a study by lead author Rathindra Bose, vice president for research and a professor of biomedical sciences and chemistry at Ohio University. The findings, says Bose, suggest a "paradigm shift" in the development of cancer treatments. The compounds could have fewer side effects than current drugs on the market, such as cisplatin, because they activate specific cancer-killing genes and don't penetrate the cell nucleus. Patents are pending on the work. Currently, Bose and his co-workers are testing the compounds in mice models.



RICK FAYDA