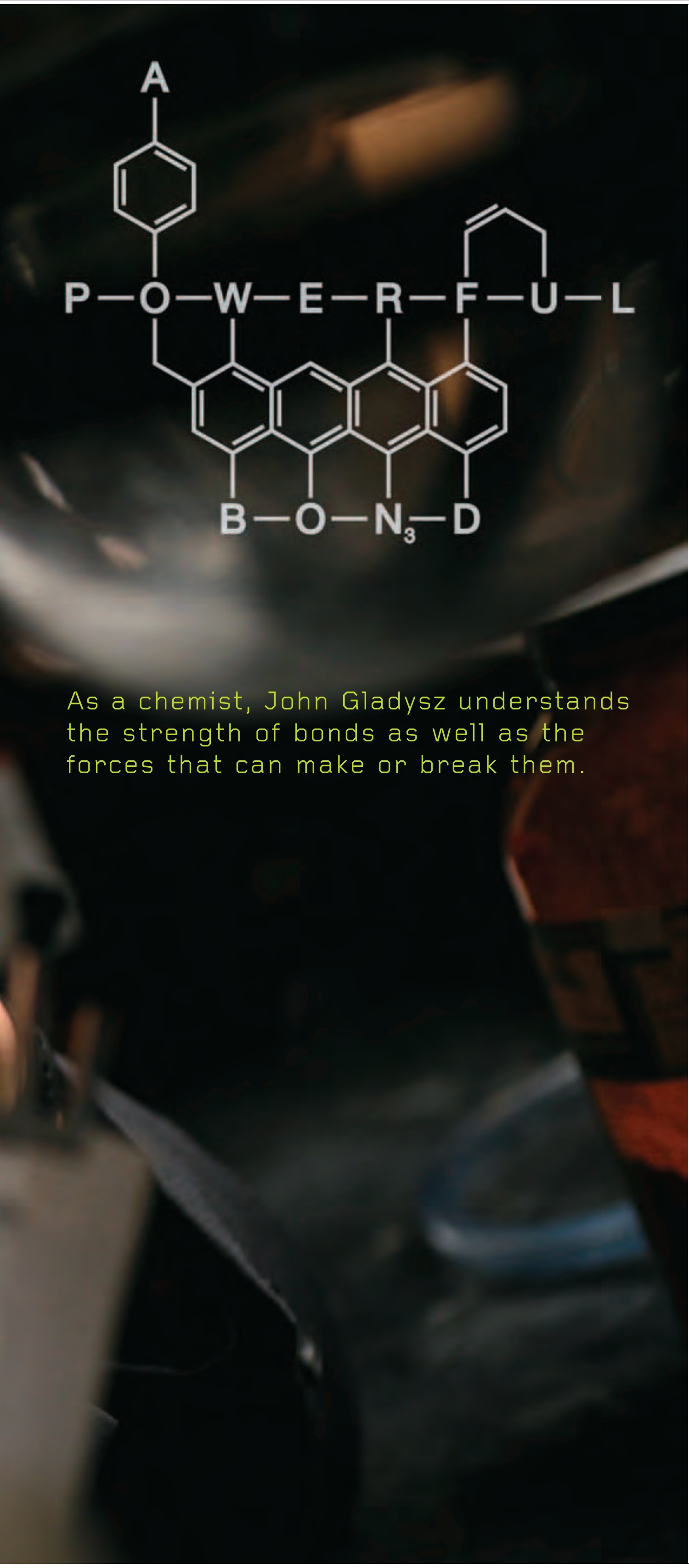


A POWERFUL BOND

As a chemist, John Gladysz understands the strength of bonds as well as the forces that can make or break them.

For John Gladysz, life revolves around finding the right fit, whether the goal is to unlock the full potential of the carbon-based molecules he studies or to determine the best environment for his chemical research. In the case of the molecules, it involves the right metal partner. In the case of his research, it involves one of the nation's top-ranked chemistry departments and Texas A&M University.

During his 34-year career, Gladysz has achieved international renown for his work in organometallic chemistry, the mixing of metals and carbon to create novel molecules. In 2007, after 10 years as holder of a major research chair at the University of Erlangen-Nuremberg in Germany, he returned to the United States as a professor of chemistry at Texas A&M and the inaugural holder of the Dow Chair in Chemical Invention. In September, he was named distinguished professor, the highest academic rank a faculty member can attain at Texas A&M. Gladysz held previous faculty positions at the University of Utah (1982–1998) and UCLA (1974–1982).

Gladysz came to Texas A&M because he simply couldn't pass up a prestigious chair tailor-made for him in a family-friendly environment ripe with research potential.

"I think Texas is particularly good at chairs," Gladysz explains. "It's a tradition that the Robert A. Welch Foundation started for the state to help its universities attract internationally prominent chemistry faculty. Also, I like chairs at state schools, which often have a safety net of support lacking at private universities."

The Department of Chemistry also hired Gladysz's wife, Janet Bluemel, as a full professor. This proximity is important because the couple previously had held appointments at universities several hours apart in Germany.

Gladysz has long-standing ties with Dow. He was born and reared in the Kalamazoo, Mich., area in the shadow of Dow's corporate headquarters. And he has presented at several Dow conferences and events. In addition, Gladysz has visited the company's Midland research and production site several times, and in 1994 he received Dow's American Chemical Society Award in organometallic chemistry.

WORTHWHILE WAIT

Those ties and the timing could not have been more critical for Gladysz and the Texas A&M Department of Chemistry, which was mourning the deaths of prominent researchers Drs. Albert Cotton and Ian Scott. The department also strived to replace them with similar-caliber faculty and to realize the potential of a chair that had been dormant for nearly eight years.

Established in the mid-1990s as a professorship intended for Nobel laureate Sir Derek H. R. Barton, the Dow position remained in limbo after Barton's death in 1998. Two years later, it was enhanced to an endowed chair using departmental and College of Science funds combined with Bright Chair Program matching funds and additional gifts from Dow to create a permanent $2 million endowment for the Dow Chair in Chemical Invention.

The interest on this endowment, which is managed by the Texas A&M Foundation, pays Gladysz an annual stipend, which in turn funds salaries for graduate students, laboratory technicians and other staff as well as equipment purchases and travel.

While it was one of the most prestigious faculty chairs at Texas A&M, the Dow chair remained unfilled until Gladysz's U.S. return.

"I am very likely the type of chemist the donor envisioned when they set up this chair," Gladysz says. "My research centers on catalysis, or making chemicals, which is the core of Dow's business. Furthermore, we specialize in recoverable catalysis—getting things back for reuse, which results in less waste and greener, more environmentally friendly processes—strong areas of interest for Dow and for the world."

Gladysz's research touches a broad spectrum of fields and industries, including nanotechnology, organic synthesis, enantioselective reactions, stereochemistry, and mechanism and materials chemistry. Each area and application hinges on what he describes as his real strength: an innate ability to develop practical methodology to synthesize relevant molecules.

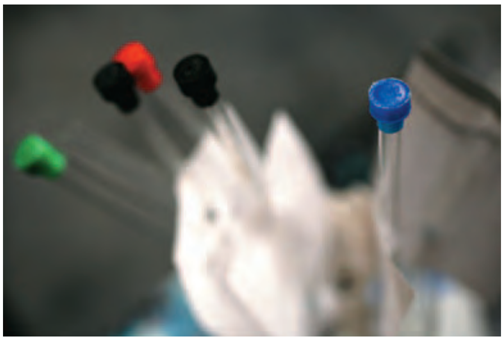
"In scientific research, there's a time and a place to be a problem-solver," Gladysz says. "But it's a good idea to first try to access some spectacular new family of materials and then worry about what applications they may have. If you can break into such new regimes, you immediately start working on practical uses that can lead to research support.

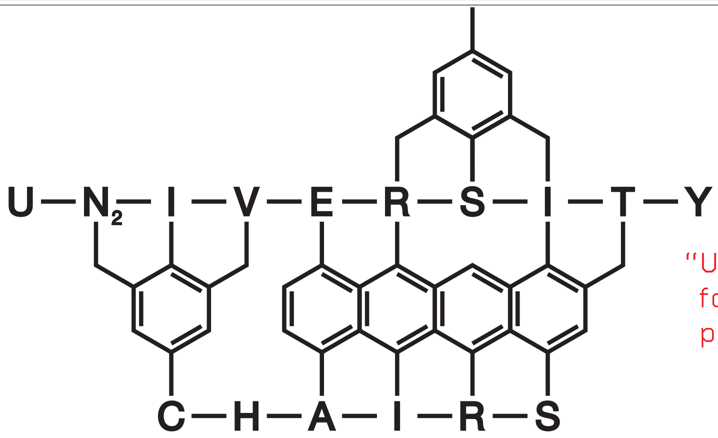
MANIPULATING MOLECULES

Four years ago, Gladysz and his research group succeeded in creating the world's longest example of a molecular wire, a single carbon chain made up of one-dimensional carbon atoms that are single- or triple-bonded to the next carbon atom. The group's 28-carbon feat made international headlines.

Based on his theoretical calculations, Gladysz says his record is made to be broken, and he intends to do just that in the spirit of all things science, not to mention Texan and Aggie. "When we got to 28 in 2004, it was all over the German media. I know more or less what's going to happen when we get to 32, 40, et cetera. ... We're not going to learn that much regarding physical properties, but in a society obsessed with records, it will be a big media moment."

In a separate effort, Gladysz has pioneered the field of molecular gyroscopes. They obey the same physics as macroscopic gyroscopes, which are stabilizing devices used in airplanes, spacecraft, virtual-reality helmets and navigation systems. Gladysz's group can control everything from the size of the gyro-





> "University chairs are wonderful vehicles for doing cutting-edge research and pursuing specific ideas."
>
> **JOHN A. GLADYSZ, PH.D**
> Distinguished Professor
> Dow Chair in Chemical Invention

scope cage to the molecules that have access to the interior. In addition, they can effect unidirectional rotation—analogous to "pulling the string" on a toy gyroscope—by manipulating external electrical fields.

Gladysz's new team at Texas A&M is attempting to synthesize arrays of such gyroscope-like rotators to create microscopic, modern-day "waterwheels" that would have many health-care and industrial applications.

"People want to do things in small scales—the equivalent of a lab on a chip, which could be made smaller with such a water wheel," Gladysz says. "Chemists are trying to duplicate the classic, familiar machines we have on a molecular basis."

STICKY BUSINESS

Another of the Gladysz group's current interdisciplinary frontiers is organofluorine chemistry, which involves replacing hydrogen with fluorine in organic molecules to profoundly influence their chemical and physical properties. These molecules can be used in catalyst recovery and nuclear waste remediation.

Gladysz has designed many new catalysts containing fluorinated segments and has had much success recovering them by manipulating temperatures and using an unthinkable substance—Teflon®, which is one of the most famous products ever manufactured by one of Dow's chief rivals, DuPont. Although nothing is supposed to stick to Teflon, Gladysz's catalysts do, accumulating as they cool. The Teflon can be used in the form of tapes (similar to those from desktop dispensers), reactor liners and even the popular outerwear insulation Gore-Tex®. The fluorinated catalysts can be employed in transformations relevant to the pharmaceutical industry. They also can work in tandem with fluorinated receptors to detoxify harmful substances, literally sucking toxins out of the environment.

"When you start working with fluorine, the world comes knocking. Fluorine changes properties, and you can get into new worlds or 'parallel universes' with these properties."

Gladysz is quick to point out that these vital research gambles could not occur without private funding and the donors who invest in the future of Texas A&M, the U.S. and our world.

"University chairs are wonderful vehicles for doing cutting-edge research and pursuing specific ideas," he adds. "They allow the flexibility to try out an idea that's relevant today, making the discovery cycle that much quicker. They're also great for the competitiveness of the university and the American research infrastructure."

—BY SHANA HUTCHINS '93

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