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C&EN Talks With

Esther S. Takeuchi

Industrial battery chemist-turned-professor conveys lessons learned

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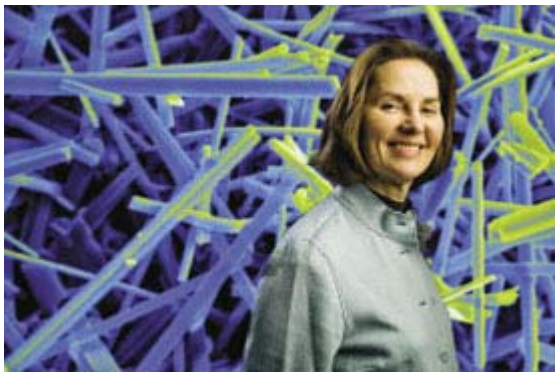
WHEN THE TEENAGER, call her Nancy, felt what she thought must have been a smack in her back by her little brother, she whipped around to retaliate. But he wasn't there. That's when she realized that the defibrillator implanted in her chest had fired a punch of electricity to counter a life-threatening cardiac arrhythmia.

Esther S. Takeuchi has met a lot of people whose chests harbor implanted cardiac defibrillators powered by the lithium/silver vanadium oxide batteries she helped design during her 22-year tenure at the medical technology firm Greatbatch, in Clarence, N.Y. Takeuchi says that stories like Nancy's exemplify why she initially chose a career in industry: to make a tangible difference in people's lives.



Doug Levere

Takeuchi

Last year, she thought about other ways of making differences. That's when Takeuchi, then the company's chief scientist, met the provost of the nearby University at Buffalo (UB), part of the State University of New York system. He praised her vast knowledge of intellectual property and experience with product launches and asked whether she had considered becoming a professor. "And I thought, well, maybe I can make a contribution in different ways than I did at Greatbatch," Takeuchi recalls.

On Sept. 1, 2007, she switched jobs from company executive to university professor, ready to share wisdom built during her decades in industry and to encourage students, in particular women, to give science and engineering careers a go.

The mild-mannered scientist left Greatbatch on excellent terms. The company offered the UB Foundation

$500,000 to endow Takeuchi for five years, with no strings attached.

As result, Takeuchi is the Greatbatch Professor of Advanced Power Sources at UB, and she holds appointments in the departments of chemical and biological engineering, chemistry, and electrical engineering. At the moment, she is advising five graduate students.

The chemist is no stranger to UB. After she completed a doctorate in organic chemistry at Ohio State University, she did two postdocs in electrochemistry: first at the University of North Carolina, Chapel Hill, and then at UB when her husband, Kenneth J. Takeuchi, accepted an assistant professorship there in the chemistry department. A year later, she took a job as a bench chemist at Greatbatch. She rose to battery research group leader and then to the top ranks of company leadership.

TAKEUCHI HAS ALREADY had a distinguished career. She was elected to the National Academy of Engineering in 2004. She holds more than 140 patents, which some say means she has more patents than any living woman in the U.S., but available patent statistics make that claim difficult to confirm.

As Takeuchi reflects on what she hopes to accomplish during her transition from company executive to academic professor, she notes overarching differences between industry and academia with respect to research freedom and infrastructure.

"I think people need to realize in an academic setting just how lucky they are that when they find something interesting or when a project breaks a certain way, they can go in that direction," she says. That freedom, however, often comes without the extensive assistance of support services and personnel common in industry. "If you need pencils in the lab, you've got to go buy them," she says.

This did not stop her from bringing some corporate mentality into her university setting. In less than six months, her small UB research group transformed rooms filled with rusted benches and broken copy machines into state-of-the-art laboratories. "Everyone in the academic world said, 'Wow—that is really fast.' And I thought, are you kidding? I wanted it yesterday!"

Takeuchi is still getting used to working with students rather than with seasoned industry professionals. For example, she says, she has to remind herself that even though the principles underlying various battery technologies are thoroughly familiar to her, they are foreign to her students. "It is fun to be able to explain things to students and have them understand for the first time," she says. In the spring, she will tackle her first teaching assignment—an undergraduate class on energy storage and electrochemistry.

Takeuchi is also excited about the new opportunities her UB position will open to her for encouraging other women in the science and engineering community. Before her appointment, there was just one other woman professor in her departments. "My view is that being around, even walking around the building is pretty significant," Takeuchi says.

From the time she arrived at UB, she has participated in lunches and coffee hours set up by female graduate students to "just kind of talk about what life is like" beyond graduate school, she says.

"Women in particular need to understand that nobody really does it on their own," she says, noting by way of example that "the majority of executives that I came across usually had spouses that didn't work outside the home." She credits her success in juggling industry and a home life with her husband's pep talks on tough days and his flexible hours as a professor.

Takeuchi doesn't regret her the switch to academics. She has begun thinking holistically about energy storage, energy transfer, and new sources of energy. In addition, she recently started collaborations with colleagues in UB's medical school to develop new implantable medical devices.

With Takeuchi involved, chances are those fledgling ideas may end up boosting a female graduate student's career or eventually saving more people's lives.