Articles

Working Toward The Next Battery Breakthrough

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With more patents than any other woman, UB scientist brings fresh perspective to the nation's electrical grid

If battery-making is an art, then University at Buffalo scientist Esther Takeuchi is among its most prolific masters, with more than 140 U.S. patents, all in energy storage.

Takeuchi developed the battery that made possible the first implantable cardiac defibrillators, a feat that was recognized last fall with the National Me Technology and Innovation from President Obama. Millions of heart patients worldwide h benefited from the implantable cardiac defibrillators powered by Takeuchi's silver vanadiu oxide battery. With funding from the National Institutes of Health, she is developing new c materials for improved implantable cardiac defibrillator batteries, with her latest advances project recently published in the Journal of Power Sources.

A slide show highlighting Takeuchi's biomedical is available on YouTube: http://www.youtube.com/watch?v=Gm8MqA3u4MQ.

But now Takeuchi is applying to the electrical grid -- the vast, national network that delive energy from suppliers to consumers -- her unique perspective on how to coax the best performance out of battery chemicals.

Having two years ago made the jump from industry to academia after 22 years, Takeuchi SUNY Distinguished Professor in UB's School of Engineering and Applied Sciences, may just the scientist to find the right combination of materials that will usher in the next energ storage revolution.

"Esther has a unique perspective," says Amy Marschilok, PhD, UB research assistant pro of engineering, who has worked with Takeuchi for more than six years. "In developing the vanadium oxide material that now powers the implantable cardiac defibrillator, she took a and turned it into a functional battery."

"Now she's taking that experience and applying it to these very different areas," Marschil continues. "Could a variation on one of the battery systems one day be applied to poweri homes and buildings? That's the kind of perspective she has and it's what battery researc really needs."

In the past year, Takeuchi been awarded more than $1 million in funding by several feder agencies to develop better materials for batteries and ways to prevent their degradation.

With a new project recently funded by the New York State Energy Research and Develop Authority, Takeuchi and her husband, SUNY Distinguished Teaching Professor Kenneth Takeuchi, are developing new, low-cost materials for rechargeable batteries.

The focus is on developing a distributed grid where renewable power is generated closer where it's needed, rather than in a central place and transmitted long distances, the way current grid operates.

"One of the key challenges in moving from our fossil-fuel based system to greener, renev forms of energy is that whether you're talking about solar or wind power, these forms of e are intermittent," says Takeuchi.

And even though the sun may be shining or the wind may be blowing, it's unlikely that eit phenomenon will occur at a constant rate over time.

"There will be fairly large fluctuations in the amount of power being generated," she says.

That makes a robust, reliable method of storing energy absolutely critical. And it's a featu has been essential in the life-saving biomedical devices Takeuchi has worked on in the p

"To generate energy at a usable, consistent level, we will need to couple a dependable, e storage system with renewable power sources," she says.

Takeuchi's work on biomedical devices has provided her with an unusual appreciation for properties of batteries that have exceptional longevity. The typical lifetime of a battery in implantable device is 5-10 years and Takeuchi is one of those leading the push to increas for both biomedical and utility applications.

"Whether you're talking about the power grid, electrical vehicles or biomedical devices th is for low cost, longer life and rechargeability," she says.

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SOURCE: University at Buffalo