



Prof. Doron Aurbach

Driving Battery Technology Forward From Desalination to Electric Cars

Some academics struggle to explain the practical importance of their research to the outside world. Not Doron Aurbach. This veteran member of the Bar-Ilan Faculty of Exact Sciences has an easy-going relationship with industrial innovators worldwide, thanks to his outstanding personal leadership in the field of energy storage and conversion.


“That man I was speaking to a moment ago works for LG,” says Aurbach, referring to the Korean company that is one of the world’s largest manufacturers

of consumer electronics. “We’re also collaborating with General Motors in the US, Merck in Germany, and HPL in Switzerland, along with several Israeli companies. The number of industrial firms with which we work is a measure of the significance of what we do.”

A Bar-Ilan alumnus himself, Prof. Aurbach is best known for the primary role he played in the development and first commercial use of the lithium battery – now standard issue in cellphones and computers. Today, his research focuses on magnesium-

based batteries that can be recycled thousands of times. These non-toxic batteries demonstrate almost none of the “self-discharge” that causes batteries to weaken over time, and generate roughly twice the amount of energy as their lead-acid counterparts.

According to Prof. Aurbach, battery technologies are essential for meeting energy needs in a world with dwindling natural resources. “Part of our work focuses on creating batteries for electric vehicles, which would reduce our dependence on fossil fuels,” he



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says, adding that his group is actively collaborating with ETV Motors, a Herzliya-based company that develops solutions for extended range electric vehicles.

Aurbach’s group is also working on new technologies for storing the non-polluting energy harvested from wind turbines and solar power stations. “The sun and wind are clean, renewable sources of energy, but we can’t rely on them all the time,” he says. “Similarly, the level of energy consumption changes periodically. In alternative energy – as well as in conventional power plants – we need technologies that can hold onto the energy when it is created, so it can be delivered at times of peak consumer demand.”

This area of research – called “load leveling” – is a prime area of activity in Prof. Aurbach’s lab. “A lot of energy

is wasted because there is currently no load leveling technology that would allow power station activity to fluctuate in accordance with consumption,” he says. “This is an important practical challenge for the industry.”

In a separate area of his research, Prof. Aurbach is tackling another practical challenge: water desalination. “With Israel’s limited resources, commercial desalination is an absolute necessity,” he says, noting that worldwide, about one-fifth of the world’s population lacks dependable access to clean drinking water. “In our lab, we’re working on improved technologies for electrodialysis – a process in which voltage applied to sea water selectively moves salts through a filter, leaving fresh water behind. This is practical science, based on solving one of the world’s most pressing problems.”

Despite his outstanding record, Prof. Aurbach – who holds 12 patents for energy storage technologies – emphasizes that designing robust solutions for energy and water problems remains a slow and painstaking process. “Our achievements were based on years and years of systematic research,” he says. “This same systematic approach – which involves examining a huge number of variables – is what makes our work so valuable to our industrial partners. We do the science. They make the batteries.”

And with so many industrial leaders turning to Prof. Aurbach’s lab for the energy storage solutions that put the spark in modern technologies, Bar-Ilan University is fast becoming the “go-to” address for all that is green and environmentally friendly.