
Mountain View company plugs fuel cell solution for powering laptops

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Getting more life out of a laptop's battery is a major goal of virtually all portable computer manufacturers.

Mountain View-based **PolyFuel Inc.** is betting that its patented fiber membrane for a miniature, portable fuel cell that deftly combines methanol, water and air to create an electrical charge will all but do away with the recharging of laptop batteries. And it's getting interest from public and private investors.

"When looking at consumer complaints, (laptop) battery life is in the top three," says Thomas Urban, an investment manager for Intel Capital Inc. which is investing in PolyFuel and several other fuel cell technologies, looking for that next big breakthrough. "We're certainly not happy with the four-hour battery life we're stuck with now."

There is also a safety factor. Dell Inc. has recalled 4.1 million notebook computers due to a flaw in its laptop computer batteries. While fuel cells do tend to run hotter than traditional batteries, their fuel, particularly methanol, burns at higher temperatures and is less likely to overheat or catch fire if it should somehow leak out. However, there is a real concern about transporting replacement cartridges, especially methanol, because it is considered a flammable material. However, cartridge manufacturers say the cartridges can be sealed so that no human contact can occur. Also methanol tends to dissipate almost immediately once it hits a surface.

Portable fuel cells, either attached to a laptop or those designed to be installed inside a machine like a traditional battery, are promising 10 hours of laptop life and an immediate recharge. Unlike today's lithium-ion batteries that take up to two hours to recharge for a four-hour battery life, a portable fuel cell would be ready to go by simply replacing a fuel cell cartridge.

Cellphone and PDA manufacturers are also looking into portable fuel cells, not so much for longevity but for additional power. Cellphone manufacturers are reaching the limit of what they can do with their handsets unless they find a way to increase the power available to them.

As mobile TV and complex video games join and MP3s, the need for additional power that a fuel cell can provide becomes more acute.

Investors are sinking millions of dollars into portable fuel cell devices and competing technologies.

Besides methanol-based fuel cells, hydrogen, sodium hydrate and even various metal hydrate-based fuel cells are competing for investor dollars.

"We haven't made up our mind on which one we think will ultimately prevail," Mr. Urban says. "I don't think there is a broad consensus yet."

Meanwhile, the current state-of-the-art battery, lithium-ion, may be getting more efficient. There are reports that its four-hour laptop lifespan could be doubled by 2009.

"We're looking at a hybrid system that has fuel cells augmenting traditional batteries rather than a replacement system," Mr. Urban says.

Virtually all the major laptop and cellphone manufacturers are funding battery and fuel cell research. Freedonia Focus Group estimates portable power sources will be a \$9.6 billion market by 2009. Frost & Sullivan estimates there will be 80 million "micro fuel cell-powered devices" on the market by 2012.

PolyFuel doesn't actually make fuel cells. Rather it is concentrating on the membrane that combines methanol, water and air to create the electrical charge. A fuel cartridge would most likely be a combination of methanol and water although the company is experimenting with a pure methanol fuel cartridge that would provide more oomph when needed.

PolyFuel Chief Executive Officer Jim Balcom is convinced that methanol is the most efficient power source, mainly because it is cheap and relatively little will go a long way.

PolyFuel is working with several manufacturers, including NEC and Sanyo to figure out how to incorporate its membrane to make a miniature, methanol fuel cell work effectively. The company recently received a \$1 million grant from the federal Department of Energy and has held discussions with Department of Defense officials eager to find a portable energy source for a myriad of military computers and other equipment. The company has raised \$70 million in private investments and is listed on the London-based AIM stock exchange.

Other potential uses include remote security cameras, medical equipment, lighting and virtually anything else that needs a stable energy source.

But there are problems.

While a fuel cell can easily supply the 12 watts on which a laptop typically runs, it is unclear whether it can handle those brief energy spikes of up to 60 watts that a laptop sometimes requires. And today's fuel cells are still too big to fit into a laptop, cellphone or PDA. If lithium-ion researchers ever do come up with an eight-hour laptop battery life, is there any real benefit of an 10-hour fuel cell? Then there is the heat generated by today's miniature fuel cells which will require more robust laptop cooling systems at a time when laptops are getting thinner and quieter.

"It's very unclear if any one technology will win," Mr. Urban says.

Mr. Balcom admits there are technology issues still to overcome but says that the ability to free a computer, cellphone or PDA from an electrical outlet is going to have broad appeal.

"It's going to be a lucrative market," Mr. Balcom says.

Advances made in the portable market will also help bolster the fledging automobile market, Mr. Balcom says.

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