

# Nano World: Power for soldiers, sat phones

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Nanotechnology-based power sources are expected to emerge in the next two years that could dramatically reduce the weight that soldiers carry and boost how long satellite phones can last, experts told UPI's Nano World.

Fuel cells generate electricity by reacting fuel with oxygen.

NanoDynamics in Buffalo, N.Y., is developing fuel cells that employ nanotechnology to help supply power for longer times at less weight and size than batteries or conventional fuel cells. One 50-watt solid oxide fuel-cell prototype, roughly the size of a loaf of bread, is composed of roughly 20 percent nanomaterials and can generate some 3,000 watt-hours of electricity from just 5 pounds of propane. A conventional solid oxide fuel cell given that little propane would generate only one-half to one-third as many watt-hours.

The prototype, "originally designed for a combat soldier, could replace about 35 pounds of batteries," said Keith Blakely, chief executive officer at NanoDynamics. He and others discussed their devices at the NanoCommerce & SEMI NanoForum conference in Chicago last week.

NanoDynamics essentially takes conventional fuel-cell components such as their membranes, electrodes and catalysts and miniaturizes them, increasing fuel-cell power density. Unlike conventional fuel cells, which use hydrogen gas, their prototypes use propane gas, "the kind you find at camping stores," Blakely said.

NanoDynamics has programs with the U.S. Army to develop a fuel cell

until the end of 2006. "It may not be that a 50-watt system makes sense for a soldier, but maybe a 200- or 250-watt system to recharge batteries for a platoon," Blakely said.

NanoDynamics is also developing a second-generation nanotechnology-based fuel cell with 60 percent nanomaterials, for 50-watt systems only three-quarters of an inch long, and a third-generation device made of 80 percent nanomaterials. "We are based on operating at about 800 degrees C, so it's not a pocket device," Blakely cautioned. "But for a soldier on a three-day mission dealing with the weight of batteries or a wheelchair on a back of a van, it could replace a lot of weight."

Burnaby, Canada-based Tekion is developing nanotechnology-based fuel cells for phones and computers. Tekion's fuel cells do not use hydrogen either, but formic acid instead, the same kind bees and ants use in their venom. "Formic acid isn't flammable," said Tekion President and Chief Executive Officer Neil Huff, while being considerably reactive at the same time for relatively high power generation, "which is key to making devices smaller." They currently employ nanoscale catalysts and membranes and hope to miniaturize the rest of their components as well.

Initially, Tekion is targeting satellite phones and hopes to have its first product out in 2007. "Satellite phones are larger devices, so they give you more space to work with," Huff said. Moreover, "satellite phones are typically used off-the-grid, so our batteries could help them operate for extended periods of time."

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