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Soy Powers New Rechargeable Batteries



Cell phones and laptop computers are essential tools for both business and personal use, and they are, of course, powered by rechargeable batteries. Traditionally, these batteries have contained heavy metals and were toxic, but environmental help may be on the way in the form of biofuel cells powered by soybean oil.

The United Soybean Board (USB) and the Nebraska Soybean Board and soybean checkoff are working with researchers at St. Louis University to determine the feasibility of soybean oil as a fuel for biofuel cell batteries. A biofuel cell is an electrochemical device that converts energy derived from chemical reactions to electrical energy by means of the catalytic activity of living cells and/or their enzymes. Soybean oil and

biodiesel have both proven to be effective fuel for this purpose.

"Soybean oil is a wonderful fuel for a biofuels cell, because it has a high-energy density and can be easily oxidized by lipoxygenase enzymes," says Dr. Shelley Minteer, associate professor of chemistry at St. Louis University (SLU).

Biofuel cells can be used for portable electronics, sensors and in any item you would normally use a lithium ion battery or a nickel metal hydride (NiMH) battery. Biofuel cells are reasonable replacements for rechargeable batteries but not disposable batteries. In fact, biofuels cells have several advantages over traditional rechargeable batteries.

"Conventional batteries are made of heavy metals that are toxic and an environmental hazard, but this cell contains no metals and is biodegradable, so it is much more environmentally friendly," says Minteer. "In addition, biofuel cells last longer between charges and are less expensive."

Biofuel cells allow for instant recharging by simply adding more fuel, and they use less energy because they use the biofuels rather than electricity to recharge batteries. Soybean oil as a fuel provides higher energy density than ethanol, methanol and other sources of fuel that have been tested.

The only disadvantage to biofuel cells is that they don't work at very high temperatures, such as 60 degrees Celsius (140 degrees Fahrenheit) and above.

The technology for biofuels cells has been licensed to a start-up company that is looking to commercialize the technology in the next three to five years. Biofuel cells have potential not only in private industry, but in the military and government, as well.

"The bottom line is the technology is well underway, and biofuel cells can absolutely replace traditional rechargeable batteries," says Todd Allen, USB New Uses chair and a soybean farmer from West Memphis, Ark. "If and when biofuel cells are made in mass quantities, they could easily replace many rechargeable batteries."

To learn more about new uses of soybeans visit www.soynewuses.org. To learn more about SLU research projects visit www.slu.edu.

USB is made up of 64 farmer-directors who oversee the investments of the soybean checkoff on behalf of all U.S. soybean farmers. Checkoff funds are invested in the areas of animal utilization, human utilization, industrial utilization, industry relations, market access and supply. As stipulated in the Soybean Promotion, Research and Consumer Information Act, USDA's Agricultural Marketing Service has oversight responsibilities for USB and the soybean checkoff.