

New nanotechnology converts heat into power when it's needed most

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Never get stranded with a dead cell phone again. A promising new technology called Power Felt, a thermoelectric device that converts body heat into an electrical current, soon could create enough juice to make another call simply by touching it.

Developed by researchers in the Center for [Nanotechnology](#) and Molecular Materials at Wake Forest University, [Power Felt](#) is comprised of tiny carbon nanotubes locked up in flexible [plastic fibers](#) and made to feel like fabric. The technology uses temperature differences – room temperature versus body temperature, for instance – to create a charge.

Their research appears in the current issue of *Nano Letters*, a leading journal in nanotechnology.

"We waste a lot of energy in the form of heat. For example, recapturing a car's energy waste could help improve fuel mileage and power the radio, air conditioning or navigation system," says researcher and Wake Forest graduate student Corey Hewitt. "Generally thermoelectrics are an underdeveloped technology for harvesting energy, yet there is so much opportunity."

Potential uses for Power Felt include lining automobile seats to boost battery power and service electrical needs, insulating pipes or collecting heat under roof tiles to lower gas or electric bills, lining clothing or sports equipment to monitor performance, or wrapping IV or wound sites to better track patients' medical needs.

"Imagine it in an emergency kit, wrapped around a flashlight, powering a weather radio, charging a prepaid cell phone," said David Carroll, director of the Center for Nanotechnology and Molecular Materials. "Power Felt could provide relief during power outages or accidents."

Cost has prevented thermoelectrics from being used more widely in consumer products. Standard thermoelectric devices use a much more efficient compound called bismuth telluride to turn heat into power in products including mobile refrigerators and CPU coolers, but researchers say it can cost \$1,000 per kilogram. Like silicon, they liken Power Felt's affordability to demand in volume and think someday it could cost only \$1 to add to a [cell phone](#) cover.

Currently, 72 stacked layers in the [fabric](#) yield about 140 nanowatts of power. The team is evaluating several ways to add more nanotube layers and make them even thinner to boost the power output.

Although there's more work to do before Power Felt is ready for market, Hewitt says, "I imagine being able to make a jacket with a completely thermoelectric inside liner that gathers warmth from [body heat](#), while the exterior remains cold from the outside temperature. If the Power Felt is efficient enough, you could potentially power an iPod, which would be great for distance runners. It's definitely within reach."

Wake Forest is in talks with investors to produce Power Felt commercially.

More information: For more information on Power Felt and thermoelectrics research at Wake Forest, go to www.wfu.edu/~carroldl/Thermoelectrics.html

Provided by Wake Forest University

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