Clean Technology

Powering Devices with Piezoelectric 'Sponge'

View U.S. Patent No. 9,444,030 in PDF format.

WARF: P130228US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing nanoporous polymer film that generates electrical energy from vibrations.

Overview

Piezoelectric materials produce electric charge in response to mechanical stress. Such materials can be utilized as very small 'nanogenerators' that absorb vibrations from the environment (e.g., acoustic waves, car motion, etc.) and output sub-milliwatt energy. This is sufficient to power LEDs, speed sensors and other small devices.

Although exciting, nanogenerators require bendable components not easily integrated with portable electronics like cell phones. New nanogenerator designs must be simpler to fabricate and have good energy conversion efficiency.

The Invention

UW–Madison researchers have developed a thin piezoelectric film that converts ambient vibrations into electrical energy and can be directly integrated onto the surface of a device.

The film is made by dispersing metal oxide or other nanoparticles into a solution of a piezoelectrically active polymer like PVDF (polyvinylidene fluoride). The solution is allowed to dry into a sponge-like layer. The nanoparticles then are etched away or otherwise removed. This leaves a finely porous matrix that can be sandwiched between electrodes to create a nanogenerator.

Applications

- Nanogenerators for wireless sensors, battery chargers, laptops, tablets and other portable electronics

Key Benefits

- Design is simple and compact.
- Enables piezoelectric material to be thin and flexible
- Film can be directly attached to devices, eliminating the need for other components.
- Films can be tailored for desired characteristics based on the size and distribution of nanoparticles.

Additional Information

For More Information About the Inventors

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Publications

- Sponge-Like Piezoelectric Polymer Films for Scalable and Integratable Nanogenerators and Self-Powered Electronic Systems

Tech Fields

- Clean Technology : Energy storage, delivery & resource efficiencies
- Materials & Chemicals : Polymers

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867

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