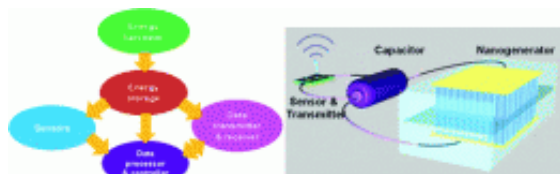


# First self-powered device with wireless data transmission

15 June 2011



Scientists are reporting development of the first self-powered nano-device that can transmit data wirelessly over long distances. In a study in ACS's journal *Nano Letters*, they say it proves the feasibility of a futuristic genre of tiny implantable medical sensors, airborne and stationary surveillance cameras and sensors, wearable personal electronics, and other devices that operate independently without batteries on energy collected from the environment.

Zhong Lin Wang and colleagues explain that advances in electronics have opened the door to developing tiny devices that operate battery-free on minute amounts of electricity that can be harvested from the pulse of a blood vessel, a gentle breeze, or the motions of a person walking. "It is entirely possible to drive the devices by scavenging energy from sources in the environment such as gentle airflow, vibration, sonic wave, solar, chemical, and/or thermal energy," the scientists explain.

The device consists of a nanogenerator that produces electricity from mechanical vibration/trigging, a capacitor to store the energy, and electronics that include a sensor and a [radio transmitter](#) similar to those in Bluetooth mobile phone headsets. Their device transmitted [wireless signals](#) that could be detected by an ordinary commercial radio at distances of more than 30 feet.

**More information:** "Self-Powered System with Wireless Data Transmission" *Nano Lett.*, 2011, 11 (6), pp 2572 - 2577 [DOI: 10.1021/nl201505c](https://doi.org/10.1021/nl201505c)

## Abstract

We demonstrate the first self-powered system driven by a nanogenerator (NG) that works wirelessly and independently for long-distance data transmission. The NG was made of a free cantilever beam that consisted of a five-layer structure: a flexible polymer substrate, ZnO nanowire textured films on its top and bottom surfaces, and electrodes on the surfaces. When it was strained to 0.12% at a strain rate of 3.56% S<sup>-1</sup>, the measured output voltage reached 10 V, and the output current exceeded 0.6  $\mu$ A (corresponding power density 10 mW/cm<sup>3</sup>). A system was built up by integrating a NG, rectification circuit, capacitor for energy storage, sensor, and RF data transmitter. Wireless signals sent out by the system were detected by a commercial radio at a distance of 5 - 10 m. This study proves the feasibility of using ZnO nanowire NGs for building self-powered systems, and its potential application in wireless biosensing, environmental/infrastructure monitoring, sensor networks, personal electronics, and even national security.

Provided by American Chemical Society

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