



The Evercell™ Power Cell

Updated March 13, 2019

Overview

The Evercell™ power cell from Evergreen Technologies, LLC (one of The Face® Companies) is a semiconductor-based thermal energy harvester that can serve as an alternative to batteries by providing permanently sustainable power for a broad array of low-power sensors, embedded circuits and wireless communications devices. The patented and patents-pending Evercell™ incorporates a breakthrough technology – a passive structure – to harvest thermal energy from any environment in which the temperature is above absolute zero (minus 460° F). Evercell™ has no need for other external stimuli, including motion, pressure, RF or electromagnetic energy. An Evercell™ demonstrator has been operating since October 2016, generating a continuous flow of electrical output with no reduction in performance over time.

How It Works

The Evercell's™ energy harvesting (EH) element is comprised of four very thin layers, in the tens to hundreds of nanometers range. Opposing electrodes sandwich a dielectric that is less than 200nm thick. The surface of the donor electrode is surface treated, based in part on semiconductor principles, to lower its work function, thereby imposing a low work function surface in intimate contact with the donor electrode and facing the dielectric.

The surface of the donor electrode is treated to reduce its work function to typically 1.0eV or less. The receptor electrode is formed of a material with a work function typically 2.0eV or greater. Electron migration occurs as electrons constantly in motion are able to more easily escape the donor electrode surface and accumulate on the receptor electrode surface. The proximity of the donor and receptor electrodes, preferably in a range as small as 20 to 60nm, promotes a quantum tunneling effect for the migration and accumulation of the electrons in a measurable manner. When a load is connected between the electrodes, a manageable discharge occurs through the load. The EH elements can be stacked within the Evercell™ to scale down the packaged area and/or to scale up the power. Details regarding the science are available on request.

Patent Protected

The Evercell™ technology is protected by a number of patents that describe and varyingly claim the basic structure of the power cell, methods for making it, and its incorporation as a permanent internal power source for a number of electronics and sensor applications. Face International Corporation, the parent of Evergreen Technologies, LLC, continues to pursue a robust intellectual property strategy that has resulted in the issue of the patents listed on the Face Companies website. Additional U.S. and International patent applications directed to the technology have been filed.

Contact

For more information, contact Jeff Shepard, COO, Technology Group, The Face® Companies, jshepard@facecompanies.com, phone +1-951-205-5654.