PIEZOELECTRIC ENERGY HARVESTING AND RELATED ARTICLES

This brief literature search was conducted by a Stevens Mechanical Engineering undergraduate student during the Spring 2009 semester. The following links to articles relating to piezoelectricity energy harvesting in scientific journals and in regular news are provided for those interested in learning more about this research area.

OVERVIEW OF PIEZOELECTRICITY

The concept of piezoelectricity was first discovered by Pierre and Jacques Curie in 1880 in quartz and in Rochelle salt. When these materials are subjected to mechanical pressure, electrical potential will appear on the faces of the crystals. When the crystals are compressed, it forces negative ions within each unit cell of the crystal to rearrange itself. This leads the polarization of the unit cells and, on a larger scale, the appearance of an electrical potential difference on the faces of the crystals. The piezoelectric effects are found in several types of crystals and also in some ceramics. These materials are used in transducers, ultrasonic receivers, and in microphones.

NEWS STORIES:

Breakthroughs in Piezoelectric Power: Raising Public Awareness is a Step in the Right Direction for U.S. Sustainable Development

In efforts to promote "green" energy around the world, piezoelectric harvesting is finding many large scale applications. From nightclub floors in London to train station platforms in Tokyo to roads in Israel, new applications for this energy harvesting method are popping up around the world.

http://www.energypulse.net/centers/article/article_display.cfm?a_id=2012

Power Potent Piezoelectric Packs

A coalition of engineers from Arizona State University, Michigan Technological University, and the company NanoSonic have created a backpack that, through the use of piezoelectricity, actually generates power. The straps of the backpack are made of piezoelectric material and they generate power from the vibrations caused by walking.

http://backpacking-gear.suite101.com/article.cfm/power_potent_piezoelectric_packs

Piezoelectric paint in Finland

A footbridge in Helsinki is using piezoelectric crystals in a paint resin to detect stresses on the bridge. This unusual application of piezoelectricity shows the potential usefulness of this science.

http://www.printedelectronicsworld.com/articles/piezoelectric_paint_in_finland_00000781.asp?sessionid=1

FREE SCIENTIFIC JOURNAL ARTICLES:

Power generation with laterally packaged piezoelectric fine wires

This article introduces a new, more flexible type of nanowire piezoelectricity generating device. The device creates energy when the wire is stretched and released in small amounts and generates enough power to potentially power nanodevices.

http://www.nature.com/nnano/journal/v4/n1/full/nnano.2008.314.html

Damping as a result of piezoelectric energy harvesting

The following article describes a method of obtaining energy from an existing commercial grade piezoelectric structure. The experiment measured the overall performance of the structure as well as the damping and compared them to fairly accurate predicted values.

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WM3-48NKP5N-4&_user=605441&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000029138&_version=1&_urlVersion=0&_userid=605441&md5=6f00d37b921195447e314a5d018680bc

MEMBERSHIP ONLY SCIENTIFIC JOURNAL ARTICLES:

Comparison of Piezoelectric Energy Harvesting Devices for Recharging Batteries

This article defines the basic method and usage of piezoelectric devices. It goes on to cite a recent study that tested several commonly used piezoelectric materials against each other in order to determine their practical feasibility. http://jim.sagepub.com/cgi/content/abstract/16/10/799

Piezoelectric energy harvesting for bio-MEMS applications

This link is the abstract of a study on whether or not piezoelectric energy harvesting is possible to power bio-MEMS devices. It suggests the use of the pumping of the blood as a source of vibration for the piezoelectric devices.

http://spiedl.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=PSISDG004332000001000429000001&idtype=cvips&gifs=yes