Device with Magnetoplastic and/or Magnetoelastic Thin-Film Transducer and Pick-up Coil for Harvesting Energy

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Abstract

A device developed at Boise State University uses motion, including random, cyclic, and vibrational motion, to produce electrical power. This passive motion is transferred to linear motion through a mechanical connecting device, which deforms a magnetoplastic and/or magnetoelastic material. The magnetoplastic and/or magnetoelastic material, by means of the twin boundary deformation effect (the deformation of the surface that separates two intergrown crystals), transduces the mechanical linear motion into a change of magnetic field. The change of magnetization induces an electrical signal by a second thin-film transducer, which transforms magnetization change into current or voltage.

This device may be used to capture energy from motion such as walking, machine movement, movement of water or wind, and/or object movement caused by water or wind. For example, the system may be employed as part of a floatation device, wherein the motion of water is transduced to electrical power that may then be used to power a signaling or locator device. The device could also be used to monitor corrosion in a concrete structure, such as a bridge, where it would be powered by the vibration of the passing vehicles.

Advantages

- The system has a simple design, and may be produced in any size or shape, which provides great potential for miniaturization, nanotechnology, and ease and economy of fabrication.
- Thin film technology is advantageous for small-scale applications.
- The system works completely by itself without the need to access the grid.
- The device operates with high frequency and low displacement, which increases efficiency.

Stage of Development

This technology is developed and a patent has issued.

Boise State is looking for a Licensee for this technology.

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