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Description

This mechano-electric generator can convert the energy of human body movement and muscle stretching into electricity. This invention can provide power support for wearable electronics in situations where other sources of energy are not available. It can be used for (1) people to power wearable medical devices, (2) people in remote areas to power telecommunication devices, and (3) soldiers to power wearable devices. This generator is housed on an extremely thin, flexible, transparent and light-weighted film. It is a major breakthrough in mechano-electronic technology.

Problem Addressed

Piezoelectricity is a coupling between a material's mechanical and electrical behavior. Two-dimensional materials are of great interest as high-performance piezoelectric materials. The coupling between piezoelectricity and semiconducting properties in two-dimensional material is highly effective due to its high crystallinity and ability to withstand enormous strain. We provide methods for building a device that comprises of two-dimensional monolayer wherein the p-type transition metal dichalcogenide material and the n-type transition metal dichalcogenide material made out of molybdenum disulfide are used. Once the transition metal dichalcogenide receives energy, it is converted into electrical energy within that nano structure. This energy is then supplied to a circuit element. Such mechano-electric generators and sensors based on two-dimensional semiconductors are very attractive for applications in future self-powered electronics and carry-on electronic systems.

Advantages

- This device can be used by people to power wearable medical devices
- It can be used by people in remote areas to power telecommunication devices and rescue devices
- Soldiers can use it to power wearable devices for telecommunication or protection against bio/chemical agents
- It is flexible, transparent & light-weight

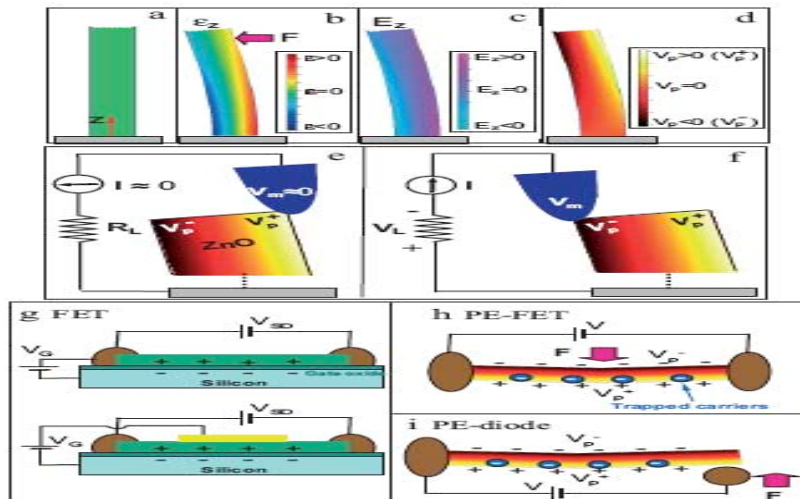


Figure One: The principle of piezoelectric nanogenerator.

Recent Publications

- S. Yu, K. Eshun, H. Zhu and Qiliang Li, "Novel Two-Dimensional Mechano-Electric Generators and Sensors Based on Transition Metal Dichalcogenides," Scientific Reports 5, 12854, page 1-11 (2015)
- A. Arab and Qiliang Li, "Anisotropic thermoelectric behavior in armchair and zigzag mono- and fewlayer MoS2 in thermoelectric generator applications," Scientific Reports 5, 13706, page 1-12 (2015)