

(Article: 14)

NANOPIEZOTRONICS: A NEWLY DEVELOPED PROMISING RESEARCH AREA AND ITS APPLICABILITY IN PIEZOELECTRIC BASED ENERGY HARVESTER

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ABSTRACT

'Nanopiezotronics': a term comprises of nano and piezotronics, proposed by Prof. Z. L. Wang (Georgia Institute of Technology, USA), after the discovery of a nanoscale device (nanogenerator) that senses the ultralow pressure/vibrations and converts into electricity¹. Initially it was mainly rely on the principle of the coupled piezoelectric and semiconducting properties of material, such as Zinc Oxide nanoroads/wires arrays. However, currently it is generalized for all kinds of nanoscale piezoelectric materials those are sensitive to ultralow mechanical stimuli. The developments in the miniaturization of portable and wireless devices, new power sources beyond rechargeable batteries have become important topics for current and future stand-alone devices and systems. Specifically, ideal power sources should be scalable for power demands of various portable devices without the necessity of a recharging process or replacement.

ABSTRACT

Recent work in the field of nanopiezotronics has shown considerable progress toward self-powered energy sources by scavenging energy from ambient environments (solar, thermal, mechanical vibration, etc.). In particular, the use of piezoelectric generators by polymer nano-structural materials and polymer nanocomposites are the robust and simple solution for mechanical energy harvesting and it has attracted remarkable attentions due to completely energy scavenging appraise and its availability. The idea is to use even body movement/biological signal due to blood flow, respiratory motion, eye lash sensation, etc. for the *in-situ* and real-time biomedical monitoring that might be operated in wireless mode. This presentation will cover the recent progress of such energy harvesting devices and its future prospective.

Keywords: Nanopiezotronics, Mechanical energy harvesting devices, Smart sensors.

¹Z. L. Wang and J. H. Song, Science **2006**, 312, 242.

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