

Conceptual Review of Combine Energy Harvesting Material

By Piezoelectric and Ferroelectric Material

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Abstract—Energy harvesting is important field now because of increasing demand and limited availability of resources. There are various ways in which we can tackle this problem such as finding out new resources, effective use of available resources, modification of technology etc. For energy harvesting most of the research has done on piezoelectric material. Even with combination of different material properties with piezoelectric material gives better result. This research paper is focused on utilization of micro energy to continuous energy generation with modification of material dimension, arrangement of material, combination of various materials.

I. INTRODUCTION

The various material are encountered in practice for different application and selection of that material is depends on their properties. In case of energy harvesting, most appropriate material will be those who have the capacity of converting one form of energy (i.e. mechanical energy) to electrical energy and vice versa. Electrical energy is superior form of energy. Many materials are available for energy conversion such as piezoelectric material, Ferroelectric material, thermoelectric material and pyroelectric material. Each material having different energy conversion property into electrical energy such as piezoelectric material deals with mechanical vibrational energy to electrical energy, Ferroelectric material behave same like piezoelectric material but it sustain charge to some extent , like wise thermoelectric and pyroelectric material deals with temperature to electrical energy. Temperatures exist when there is heat flow and utilization of this energy sometimes takes large setup. Vibrational energy is most likely to be wasted in cases such as walking, vehicle running etc. If we considered major loss of energy that is not utilized fully, the answers will be vibrational energy because it can be available near about us. With development of science and technology various method are developed to utilize this energy and most prominent way is development of MEMS (Micro-Electrical Mechanical System). In which most of focus is placed on designing a material dimension and utilization of material properties in that dimension. But this system having some limitation that it deals with properties with up to certain limit .This research paper is also utilized the concept of MEMS principle for energy harvesting with some modification.

II. PURPOSE OF PAPER

1. Keeps lighting focus on combine property of energy harvesting materials.
2. Introducing Scope of combine technology for future to get energy to great extent.

3. To focus on how to make bridge between small input to continuous energy generation.

III. COCEPT OF HARVESTING

Harvesting means process of deriving of energy from external source and utilized it to great useful manner. Device used for these purpose is called energy harvester. Most efficient form to make energy Harvester is by use of MEMS principle.



Fig. 1. Energy Harvesting System

In above diagram we can clearly see system is full focused on amount of energy gain to amount of output. In this case if available energy is vanishes output is also vanish, but what happen when continous energy is available at some extent and energy harvesting material produses continuous energy with some modification which means that it improves the performance of Energy Harvesting System.

IV. TYPE OF PIEZOELECTRIC MATERIAL

A. Piezo Disc



Fig. 2. Piezo Disc

B. Piezo Ring



Fig. 3. Piezo Ring

C. Piezo Drum



Fig. 4. Piezo Drum

D. Piezo Plate

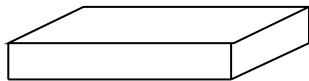


Fig. 5. Piezo Plate

In such way these are some common form of piezoelectric material shape. Similarly ferroelectric material is also having same form of shape.

V. CONCEPT OF COMPOSITE

The various papers are represented on harvesting technique where we can produce energy harvester with a very effective technique. Simulation results for output power of piezoelectric energy harvester can be improved by using multilayer structure regardless how piezoelectric layers are connected. Optimum load resistance in parallel connection is lower while open-circuit voltage is higher when piezoelectric layers are connected in series [10]. These show that piezoelectric layers are efficient in layer wise arrangement but only gap between connections affect the output voltage. By using same technique if we use alternate layer of piezoelectric and ferroelectric material it will give continuous vibration in material. If we consider alternate layer of material, when apply load at neutral position which generate potential electric field in both material which tends to move at extreme position because of internal energy. At extreme position potential electric field will vanish in piezoelectric material but remains in ferroelectric material as natural property of piezoelectric material. The potential electric field in ferroelectric material at extreme positions tends to generate vibration in combined material. In such way that we can build a system that produces the continuous energy with small input.

A. Factor affecting the system output

There are various factors that can affect the performance of system such as loading condition (i.e. weather load is point load or large area load, direction of loading application in vertical or horizontal, instant load or continuous load etc.), fix support to combined system, Properties of material, dimension of material, manufacturing of material, application of system and availability of input energy source.

B. Limitation

As system vibrate continuously it can reduces its life of operation. It can fail without any un-gesture condition.

VI. CONCLUSION

In this way these research paper have propose conceptual review of combined energy harvesting material which generate continuous energy with minimum single input. It also

Introduce the limitation and factors that can affect system formation which helpful to generate these system with less error.

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