OMICS International
conferenceseries.com

Anand Sampath et al., J Material Sci Eng 2015, 4:3
http://dx.doi.org/10.4172/2169-0022.S1.002

International Conference on
Smart Materials & Structures
June 15 -17, 2015 Las Vegas, USA

Vibration energy harvesting using pzt wafers

Anand Sampath and **Arockiarajan A**
Indian Institute of Technology Madras, India

Piezo wafers are smart materials that exhibit electro-mechanical coupling. Piezo wafers when subjected to mechanical stress accumulate electric charge and conversely mechanical strain can be obtained by the application of electric field. Due to their intrinsic electro-mechanical coupling property, quick response time, and compactness, they are widely used in energy harvesting applications, structural health monitoring systems, Piezo Wafer Active Sensors (PWAS) and so on. In this current work, vibration energy harvesting using piezo wafer is carried out experimentally and the results are validated using a proposed numerical FE model in ABAQUS. The piezo wafer specimen (PSI-5H4E) used for the analysis has a coupling coefficient of k33 higher than k31, so for experiment, it is decided to operate in 33 coupling mode, in which the excited vibration force is applied on the poling direction of the piezo-wafer. In experiment, a uni-morph cantilever beam configuration (beam has only one piezoelectric layer attached to it) is employed, which is made to vibrate by using an exciter. In order to achieve maximum power efficiency, the cantilever beam is made to vibrate at the resonant natural frequency. The geometry of the cantilever beam plays an important role in optimizing the energy harvester's efficiency and the power output. Hence, a study on the optimization of the cantilever beam dimension is also carried out using the FEA results obtained from ABAQUS.

Biography

Anand Sampath is currently pursuing his MS (By Research) in Solid Mechanics group in the department of Applied Mechanics, IIT Madras. He obtained his UG degree in Mechanical Engineering from Anna University Chennai, India, in 2012. His current fields of interests are Finite element modeling, smart materials, material characterization and coupled-field problems.

anandsampath90@gmail.com

Notes: