

Design Optimization of Low Power and Low Frequency Vibration Based MEMS Energy Harvester

Abstract

The development and utilization of different structural materials, optimization of the cantilever geometry and power harvesting circuit are the most commonly methods used to increase the power density of MEMS energy harvester. This paper discusses the cantilever geometry optimization process of low power and low frequency of bimorph MEMS energy harvester. Three piezoelectric materials, ZnO, AlN and PZT are deposited on top and bottom of the cantilever Si substrate. This study focuses on the optimization of the cantilevers length, width, substrate thickness and PZe thickness in order to achieve lower than 600 Hz of resonant frequency. The harvested power for this work is in the range of 0.02 ~ 194.49 nW.

Keywords; Energy Harvester, Low Frequency, Low Power, Piezoelectric