

Energy harvesting from ambient mechanical vibrations and electromagnetic radiations based on MOEMS and NOEMS

Gabriel Abadal Berini

Departament d'Enginyeria Electrònica. Universitat Autònoma de Barcelona. 08193-Bellaterra
(Barcelona). SPAIN

Micro and nanoelectromechanical systems (M/NEMS) have demonstrated to be a suitable technology to implement the transducer element of energy harvesting devices at the micro and nanometer scale. However, M/NEMS based realizations of vibration energy harvesters (VEH) have to overcome limitations related to the mismatch between their natural resonance frequency with the characteristic frequency of the vibration source, as well as those related to the low energy that a microsystem can extract from the ambient.

In this talk we are going to show some strategies that are oriented to treat such limitations. From one hand we are going to present a non-linear vibration energy harvester (NLVEH) implemented on an AFM triangular cantilever. Bistable non-linearity is induced by means of one electret locally charged at the free end of the AFM cantilever and another at a closely placed counter electrode.

On the other hand, proof of concept devices of micro and nano-opto-electromechanical systems (M/NOEMS) based energy harvesters, which have been designed to extract energy from electromagnetic radiation sources in the radiofrequency (RF) range and in the IR optical range, will be also presented.