

Innovative Smart Materials for Energy Harvesting Applications

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The demand for portable electronic devices and wireless detectors has increased with the growth in the production of microelectronic and mechanical systems (MEMS) in the past decade. Currently, the development of intelligent materials has been recently used for numerous applications such as electrochromic systems for perfectly improved performance. The potential of piezoelectric composite and the smart textiles has been investigated for many areas such as sensing applications. Due to various their excellent properties these materials are becoming widely attractive especially in applications intended energy harvesting. Firstly, the aim is to enhance the intrinsic proprieties of these materials in order to gain a deeper understanding of their functional properties, and to enhance their performances for a better using in the electromechanical and radio frequency conversion in order to develop the micros systems miniaturized, autonomous, communicating and totally flexible. The second part focuses, on the one hand, on the using of flexible composite films with different BCZT/Ps contents in electromechanical conversion and which allows to capture environmental vibrations and converts them into electrical energy. And on the other hand, on the development and conception a compact super-wideband flexible textile antenna which It operates over an extremely broad frequency range. Owing to its simple topology, compact size, super-wideband behaviour, and high gain, endorse its suitability for low-power requirement applications in the real world.

Keywords: Piezo-nanoparticle; Smart composite, electromechanical conversion; All-textile antenna, RF conversion, energy harvesting.