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Design and development of nanoscale materials for sensing and energy harvesting applications

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Advances in wireless sensors technology have enabled high-efficiency low power sensors that can be remotely controlled for better prognosis of structural health. In order to significantly reduce power consumption, the bottom-up approach is required to build the sensors and harvesters. Nanoscale carbon-based materials were used as substrates to build piezoelectric and magnetoelectric multifunctional materials and devices. In this study, we present their synthesis techniques, its challenges as well as proposed solutions. Microstructural characterization was performed using scanning electron microscopy, transmission electron microscopy, Fourier transform infra-red spectroscopy, X-ray photoelectron spectroscopy and energy dispersive spectrum analysis. We will give an overview of various material candidates, their advances as well as synthesis techniques and material properties along with proposed device structures.

Biography

Vishwas N Bedekar received his PhD degree from the University of Texas at Arlington. He has several years of experience in synthesis and characterization of piezoelectric and magnetoelectric materials. He has also worked on carbon-based nanomaterials and design and development of energy harvesting devices and systems. He is currently an Assistant Professor in the Department of Engineering Technology at Middle Tennessee State University. He has authored over 30 publications in peer-reviewed journals, conference proceedings and conference presentations. He has authored 2 book chapters and is the reviewer on 10 internationally circulated journals related to materials science research.

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