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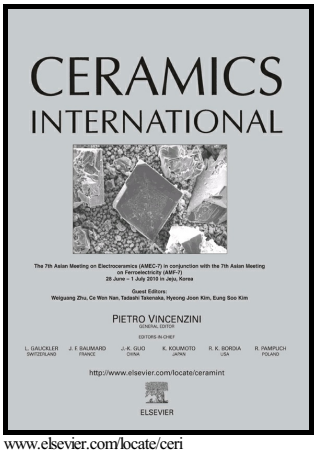

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ACCEPTED MANUSCRIPT

Polyvinylpyrrolidone modified Barium Zirconate Titanate /Polyvinylidene Fluoride Nanocomposites as Self-Powered Sensor

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Abstract:
Highly flexible biocompatible nanocomposites comprising of Polyvinylpyrrolidone (PVP) modified Barium Calcium Zirconate Titanate (BCT-BZT) /Polyvinylidene fluoride (PVDF) were fabricated. The crystalline BCT-BZT powders were synthesized by a simple sol-gel method. Rietveld refinement analysis confirmed the coexistence of orthorhombic and tetragonal phase in the synthesized powders. The structural, dielectric and ferroelectric properties of the composites were analyzed. Addition of PVP modified BCT-BZT powders was observed to enhance the polar phase in PVDF matrix. The piezoelectric output response as a function of different weight percentage of ceramic powders in the PVDF matrix was investigated. The optimal device with 60 wt% PVP modified BCT-BZT powders exhibited maximum peak to peak voltage of 23 V when tested for harnessing waste biomechanical energy (human hand palm force). The nanogenerator was easily scaled up to 4x4 cm and the stored power was utilized for powering fifty five LEDs. The fabricated device is flexible, light- weight and eco-friendly. Therefore, it can be explored as a potential candidate for application as self powered sensor.

Keywords: Lead free piezocomposites, Reitveld , Dielectric, Nanogenerator

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Introduction:

Harvesting waste energy from environment and human movements has received considerable attention to solve in the endeavour of addressing the major problem of energy crisis. The issue is addressed to a significant extent by the application of unconventional energy harvesting approaches such as solar, thermal, triboelectric, pyroelectric and piezoelectric. The usage of piezoelectric materials for energy harvesting was first proposed by Z.L Wang [1]. Piezoelectric nanogenerators are well known as an efficient approach for harvesting energy from different sources in nature such as solar, wind, hydro and motions in our surroundings like vehicle movement

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