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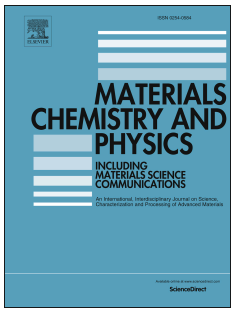

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An Effective Flexible Wireless Energy Harvester/Sensor Based on Porous Electret Piezoelectric Polymer

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Abstract

A flexible sponge-like nanogenerator (FSNG) based on ZnO nanoparticles (NPs) etched porous electret poly (vinylidene fluoride–hexafluoropropylene) (P(VDF-HFP)) film is spotlighted without any electrical poling treatment. It possesses improved dielectric and ferroelectric properties than neat P(VDF-HFP) film. The FSNG harvests an open-circuit voltage (V_{oc}) of 9 V and short circuit current (I_{sc}) of 1.3 μAcm^{-2} under repeated mechanical impact of 0.36 MPa stress amplitude on the top surface. With the power density (P) of 1.21 mW/cm^2 and energy conversion efficiency of 0.3 % it directly operates several consumer electronics. The highly sensitive (~1 μVPa^{-1}) FSNG is demonstrated as a self-powered wireless sensor with 3.0 % efficiency for detecting some tiny human activities including finger movements.

Keywords: porous, ZnO etching, energy harvester, piezoelectric, nanogenerator, electrets