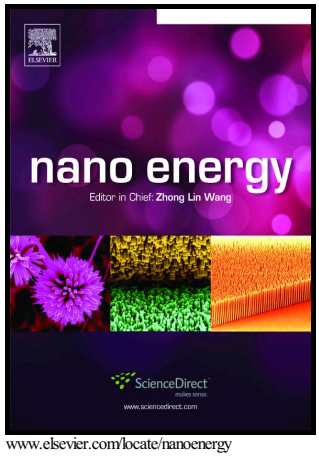

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Polarization-Free High-Crystallization *β*-PVDF Piezoelectric Nanogenerator Toward Self-Powered 3D Acceleration Sensor

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Abstract:

The strong piezoelectric lead zirconate titanate (PZT) ceramic with inherent brittleness and highly tough Poly (vinylidene fluoride) (PVDF) polymer with intrinsic weak piezoelectricity cannot simultaneously fulfill the requirements of high sensitivity and excellent stability as a piezoelectric acceleration sensor in extreme service environments, such as intense impact. Here, we developed a polarization-free high-crystallization *β*-PVDF (h*β*-PVDF) based piezoelectric nanogenerator (PENG) as acceleration sensor with high sensitivity (2.405 $nA \cdot s^2 \cdot m^{-1}$) and excellent stability (97% remaining after 10000 cycles). Fundamentally, the excellent performance benefits from the PVDF by high-pressure melt crystallization with a high *β*-phase crystallinity of 86.48%, indicative of the enhanced piezoelectricity (high short-circuit current density of 145 $nA \cdot cm^{-2}$). With integration of PENGs in three axes, the self-powered 3D acceleration sensor is developed for vector acceleration

[1] These authors contributed equally to this work.