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Electronic Supplementary Information (ESI)

Improved performance of a polymer nanogenerator based on silver nanoparticles doped electrospun P(VDF-HFP) nanofibers†

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Experimental: In this work we have used three (0.5, 1.0, 1.5) different w/v % of $AgNO_3$ with respect to the polymer solution in order to achieve the optimum device performance.

Reference solvent casting free-standing films were prepared to understand the difference in crystalline phase modifications introduced by the electrospinning procedure.

Chemical reaction involved in Ag-NPs formation:

$HCON(CH_3)_2 + 2AgNO_3 + H_2O = 2Ag^o + (CH_3)_2NCOOH + 2HNO_3$ ……**(S1)**

Eq.S1 describes the formation of Ag-NPs, where the solvent DMF [$HCON(CH_3)_2$] is acting as a reducing agent, which is also a good solvent of P(VDF-HFP). This is one of the tricks of the present study where unwanted external additives and multiple steps in Ag-NPs synthesis can be avoided.

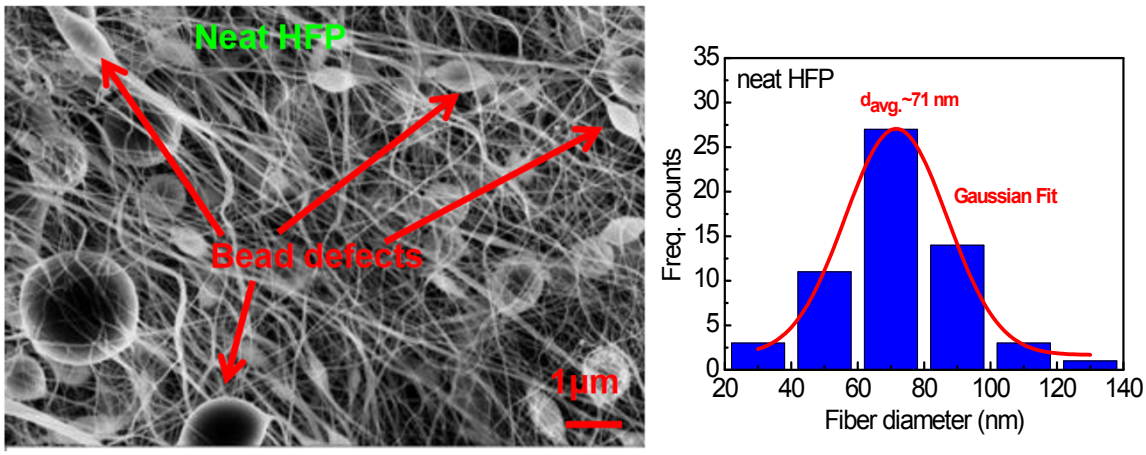

Fig. S1 Fiber morphology (FE-SEM image: left pannel) of electrospun neat P(VDF-HFP) nanofibers consisting of large number of bead defects and the corresponding fiber diameters distribution (right panel).

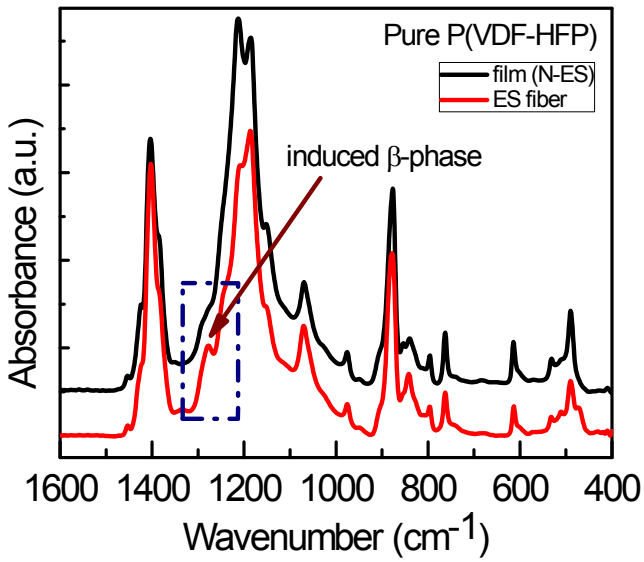

Fig. S2 FT-IR spectra of electrospun (ES) fibers and thick film (N-ES) of neat P(VDF-HFP).

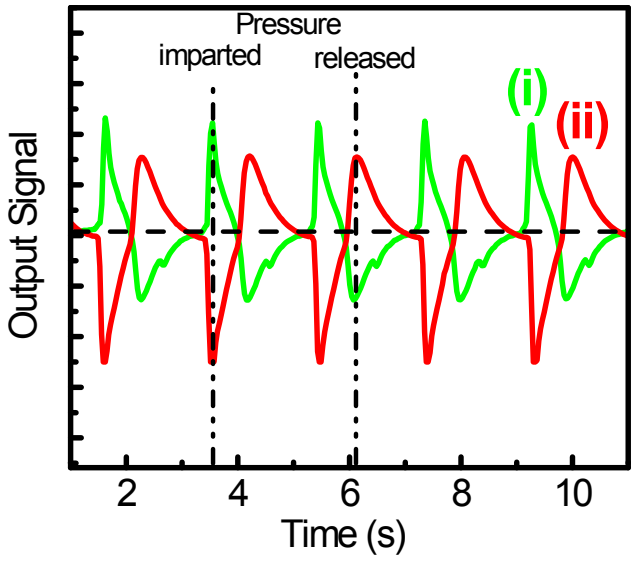

Fig. S3 The output signal from the PNG, when pressure is imparted on the surface of (i) fibers-air interface and (ii) fibers-collector interface.

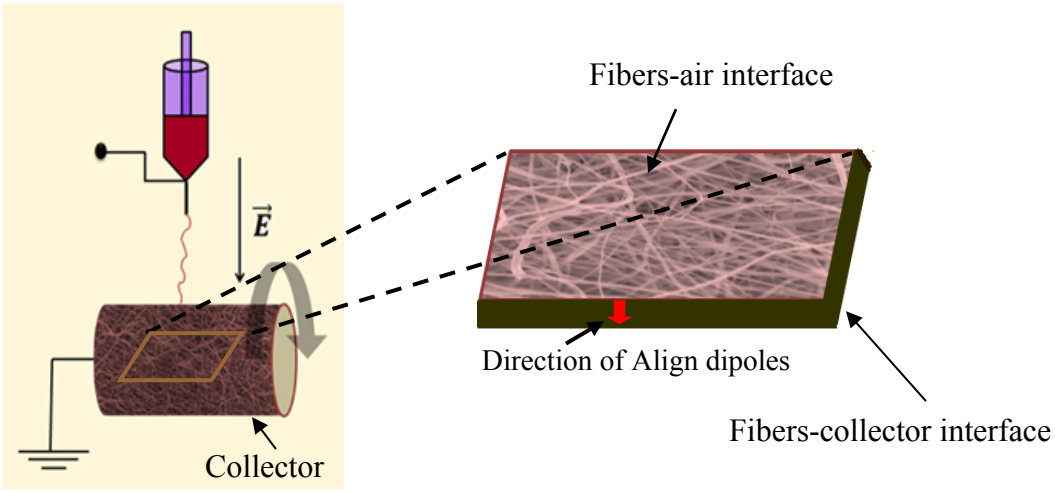

Fig. S4 The preferential alignment of the dipoles is shown in the electrospun nanofibers collected on the Ni-coated flexible substrate (right panel diagram). The direction of the dipoles is parallel to the applied electric field ($\vec{E}$) utilized in electrospinning set-up, shown in the left panel image.

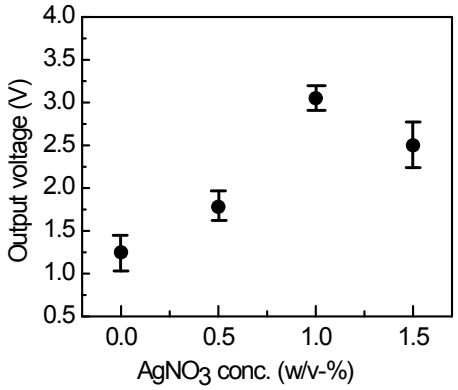

Fig. S5 The generated output voltage of the PNGs fabricated with Ag-NPs doped electrospun P(VDF-HFP) fibers, where different w/v % of $AgNO_3$ was used. The corresponding FT-IR spectra of the electrospun samples are illustrated in Fig. S6. The output voltage decreases when $AgNO_3$ is 1.5 w/v % due to the reduction of the β-phase content and the appearance of the semi-polar γ-phase with little co-existence of the non-polar α-phase (Fig. S6, sample: HFP-Ag1.5).

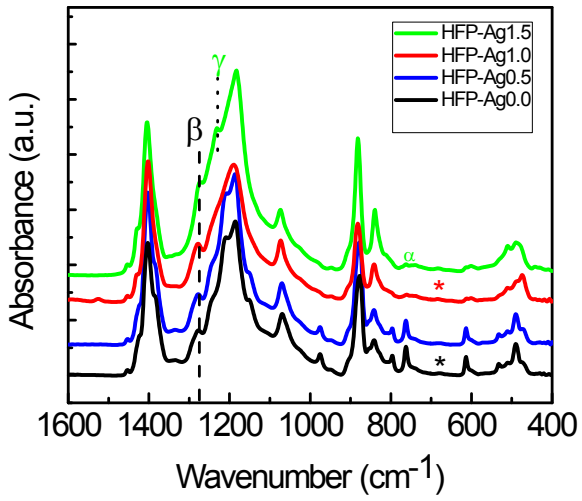

Fig. S6 FT-IR spectra of the electrospun neat P(VDF-HFP) fibers [sample: HFP-Ag0.0] and Ag-NPs doped P(VDF-HFP) nanofibers [sample: HFP-Ag#, where # indicates the w/v % of $AgNO_3$ and the solvent used]. The '*' mark the samples presented in the main article and labeled as 'neat-HFP' and 'HFP-Ag'.