Electronic Supplementary Material

Magnetoelectric effect in flexible nanocomposite films based on size-matching

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Figure S1 Optical photograph of P(VDF-TrFE)/20 wt% $CoFe_2O_4$@POTS nanocomposite film.

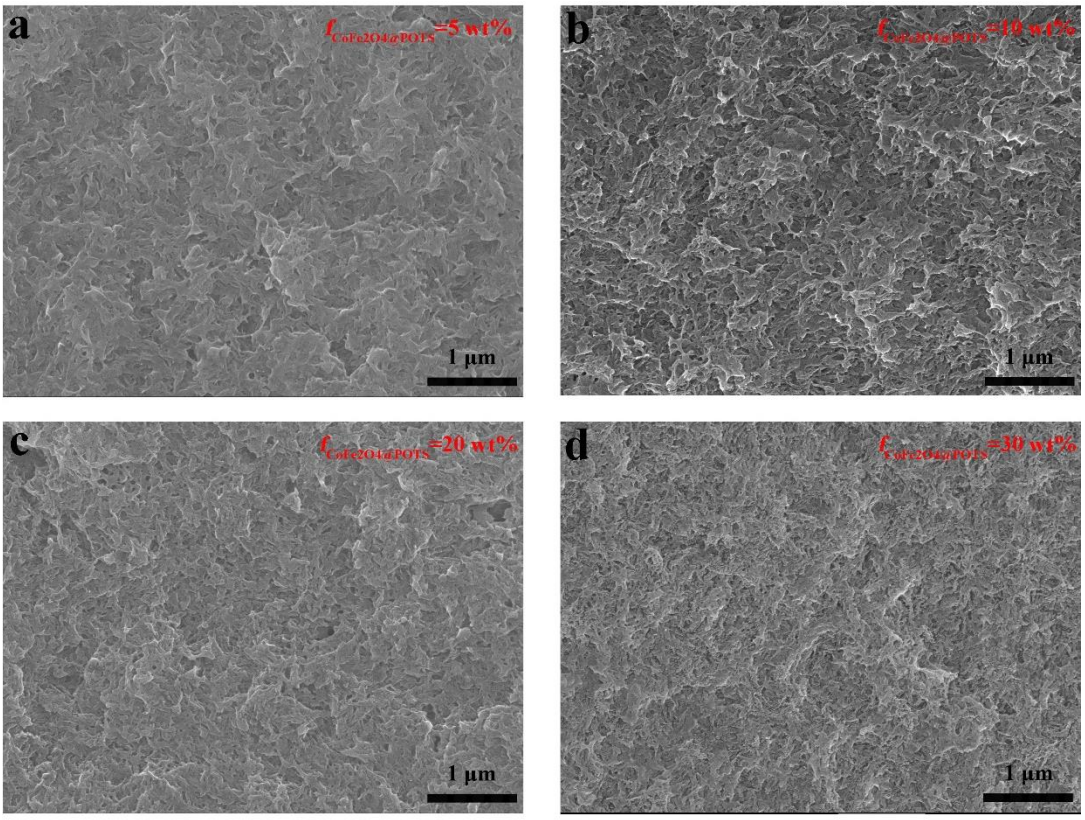

Figure S2 FESEM images of sections of P(VDF-TrFE)/$CoFe_2O_4$@POTS nanocomposite films with (a) 5 wt% $CoFe_2O_4$@POTS, (b) 10 wt% $CoFe_2O_4$@POTS, (c) 20 wt% $CoFe_2O_4$@POTS and (d) 30 wt% $CoFe_2O_4$@POTS. All films were measured after acid etching.

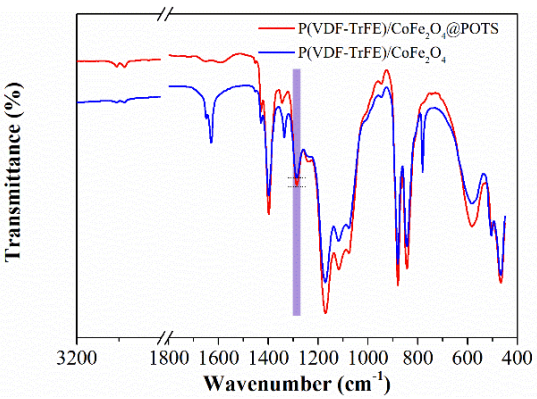

Figure S3 ATR-FTIR spectra of P(VDF-TrFE)/20 wt% $CoFe_2O_4$@POTS and P(VDF-TrFE)/20 wt% $CoFe_2O_4$ nanocomposite films. The peak at 1288 cm^{-1} is the characteristic band of the *trans*-planar phase of P(VDF-TrFE). After adding POTS, the intensity of the characteristic band at 1288 cm^{-1} in the composite film became sharper. It implied that there was a hydrogen bonding interaction between POTS and P(VDF-TrFE).

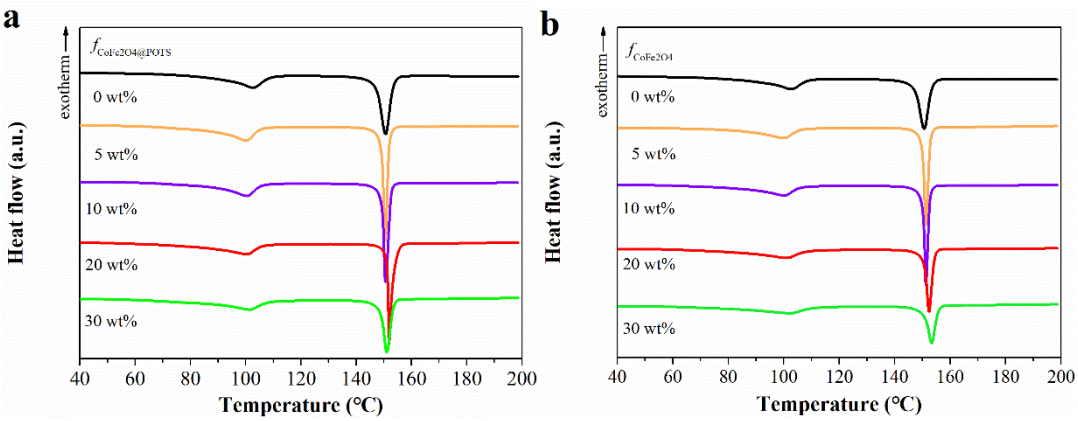

Figure S4 DSC curves of (a) P(VDF-TrFE)/$CoFe_2O_4$@POTS nanocomposite films and (b) P(VDF-TrFE)/$CoFe_2O_4$ nanocomposite films with different content of fillers.

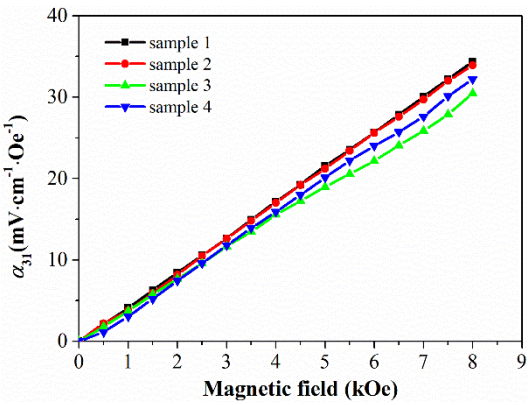

Figure S5 ME voltage coefficients as a function of the magnetic field for the P(VDF-TrFE)/20 wt% $CoFe_2O_4$@POTS nanocomposite films at the resonance frequency. Four samples were tested to check the stability and reproducibility of the prepared films. The maximum ME voltage coefficients of four samples were 34.3, 33.9, 30.5, and 32.2 mV·cm^{-1}·Oe^{-1} respectively. It is found that the relative standard deviation value was about 4.6%.

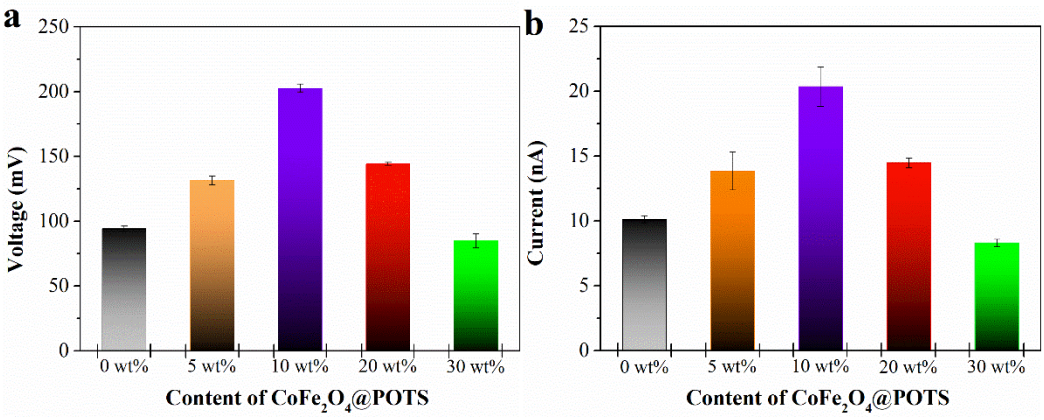

Figure S6 (a) Open-circuit voltage and (b) short-circuit current output signals of the nanocomposite film with different content of $CoFe_2O_4$@POTS under 4% strain displacement. Note that all electrode area is a unit area (10 mm×2mm).

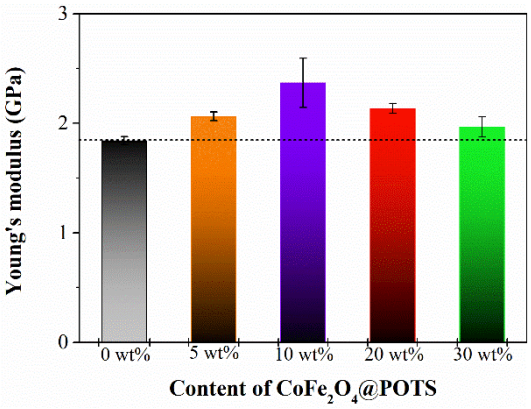

Figure S7 Young's moduli of pure P(VDF-TrFE) and the P(VDF-TrFE)/ $CoFe_2O_4$@POTS nanocomposite films.