ELECTRONIC SUPPLEMENTARY INFORMATION (ESI)

Mortise-tenon joint structured hydrophobic surface-functionalized barium titanate/polyvinylidene fluoride nanocomposites for printed self-powered wearable sensors

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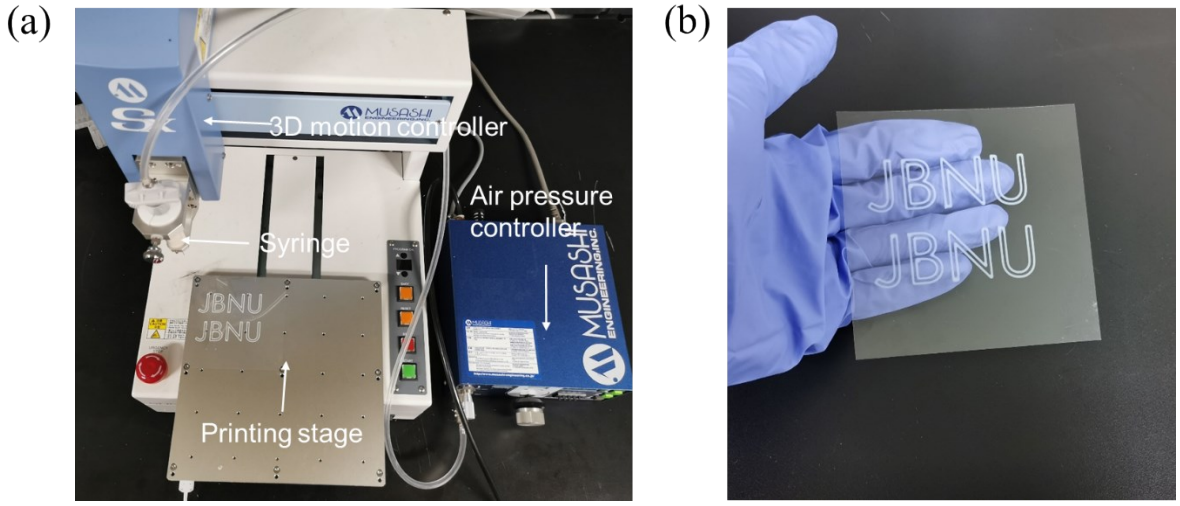

Fig. S1. (a) The photograph of 3D printing machine and (b) The illustration of printing FD-BTO/PVDF film with complex geometry on the ITO-PET film.

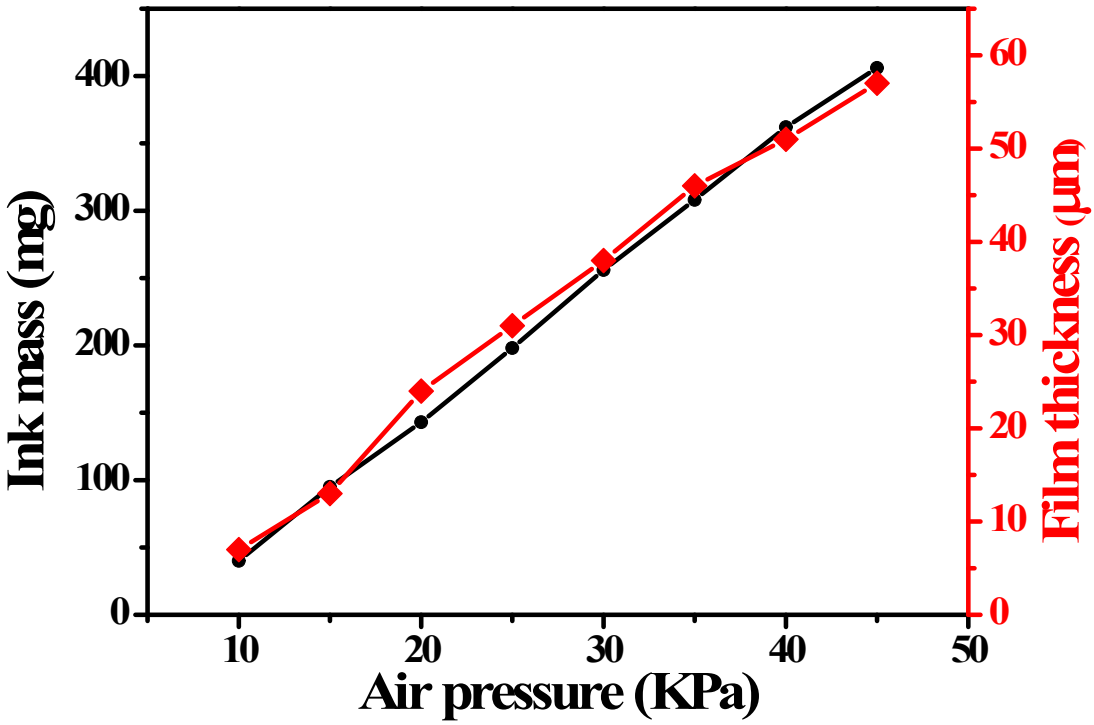

Fig.S2. The relationship between film thickness and air pressure and ink mass

FD-BTO/PVDF BTO/PVDF

Fig.S3. Optical photo after two weeks FD-BTO/PVDF ink and BTO/PVDF ink of standing. there is no noticeable particle sedimentation over two weeks for the resin mixed with functionalized particles

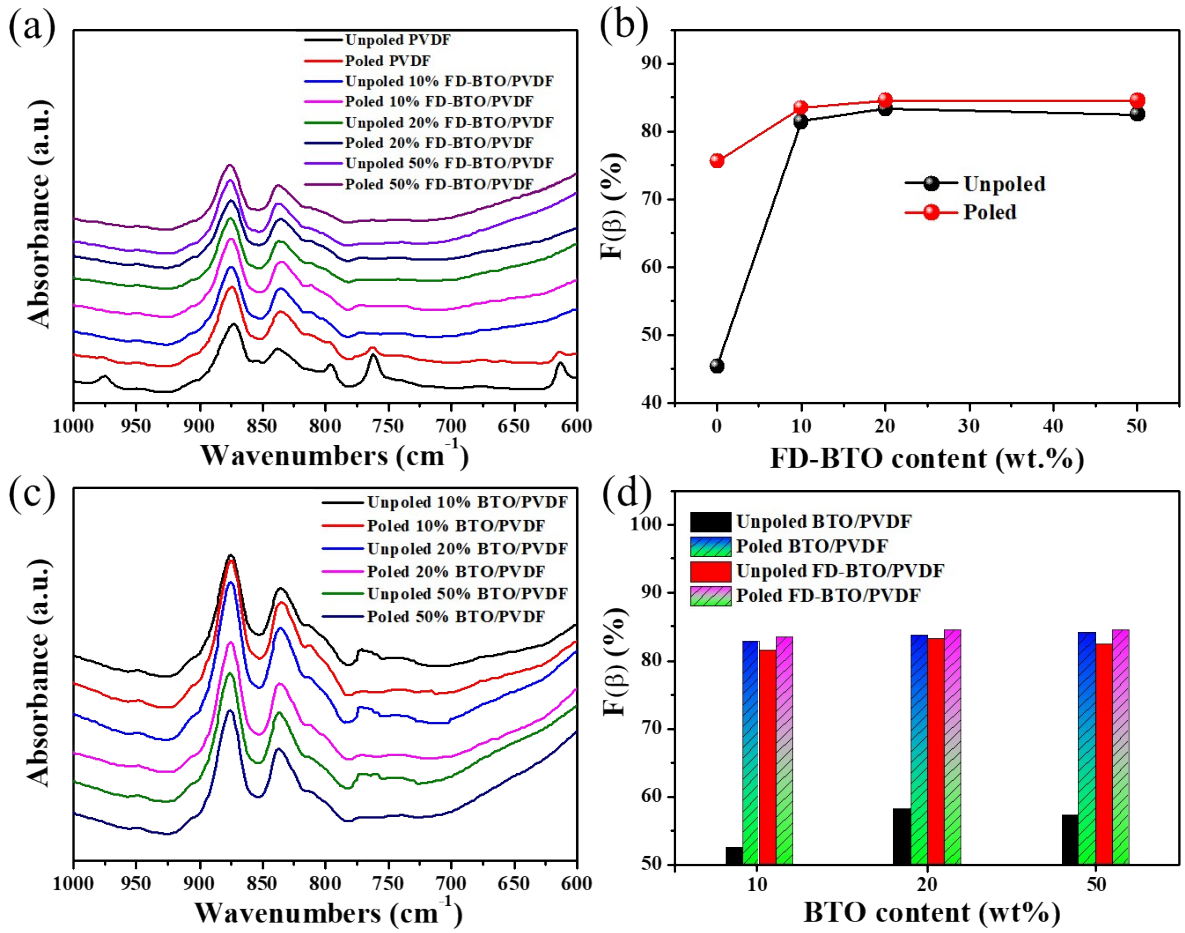

Fig. S4. (a) FT-IR spectra of the printed PVDF films with different contents of FD-BTO nanoparticles with electric poling. (b) The F(β) values in the printed samples. (c) FT-IR spectra of the printed PVDF films with different contents of BTO nanoparticles with electric poling. (d) The F(β) values in the printed samples.

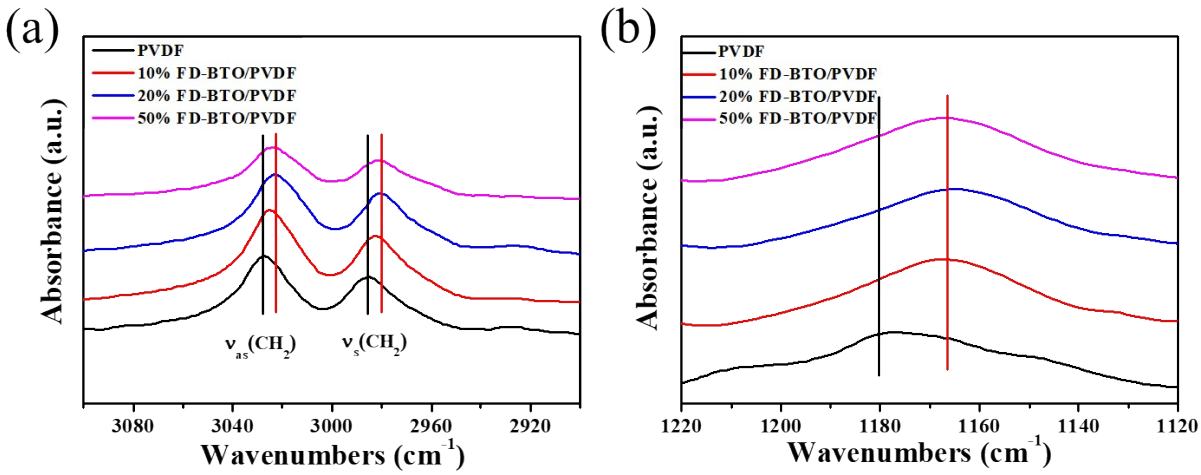

Fig. S5. FT-IR spectra of the printed PVDF films of various FD-BTO nanoparticle contents with wavenumber ranging from (a) 3100 to 2900 cm-1 and (b) 1220 to 1120 cm^{-1}.

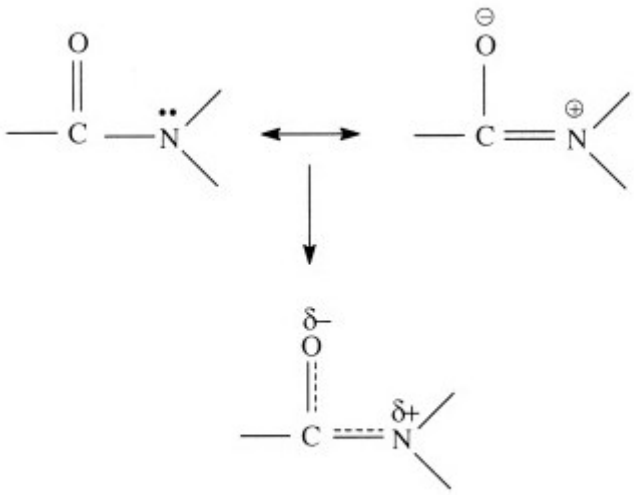

Fig. S6. The sketch of electron resonance in DMF

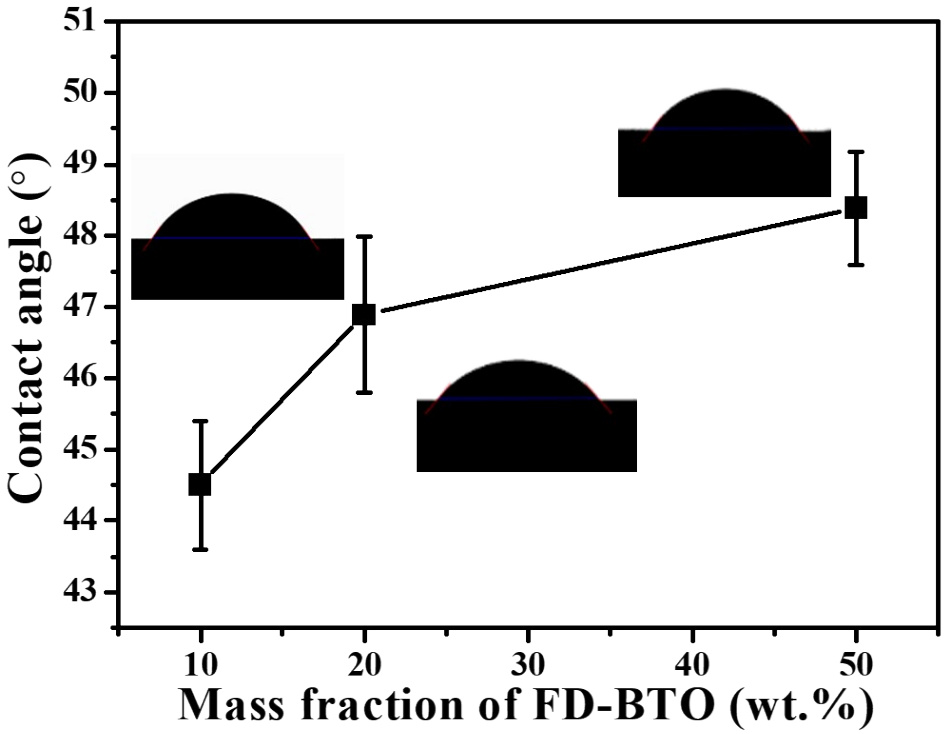

Fig. S7. contact angle of different contents of modified BTO/PVDF ink dropped on ITO-PET film.

Table S1 Calculated surface energies of samples using the contact angles measured with two different solvents

Sample details	Water CA (degrees)	Diiodomethane CA (degrees)	Surface energy (mN m^{-1})	Dispersive surface energy (mN m^{-1})	Polar surface energy (mN m^{-1})
ITO-PET	88.14	43.60	38.02	36.42	1.59
10%m-BTO/PVDF	65.03	35.86	48.20	37.94	10.03
20%m-BTO/PVDF	66.01	36.52	47.55	38.16	9.61
50%m-BTO/PVDF	72.32	33.96	45.88	39.36	6.12

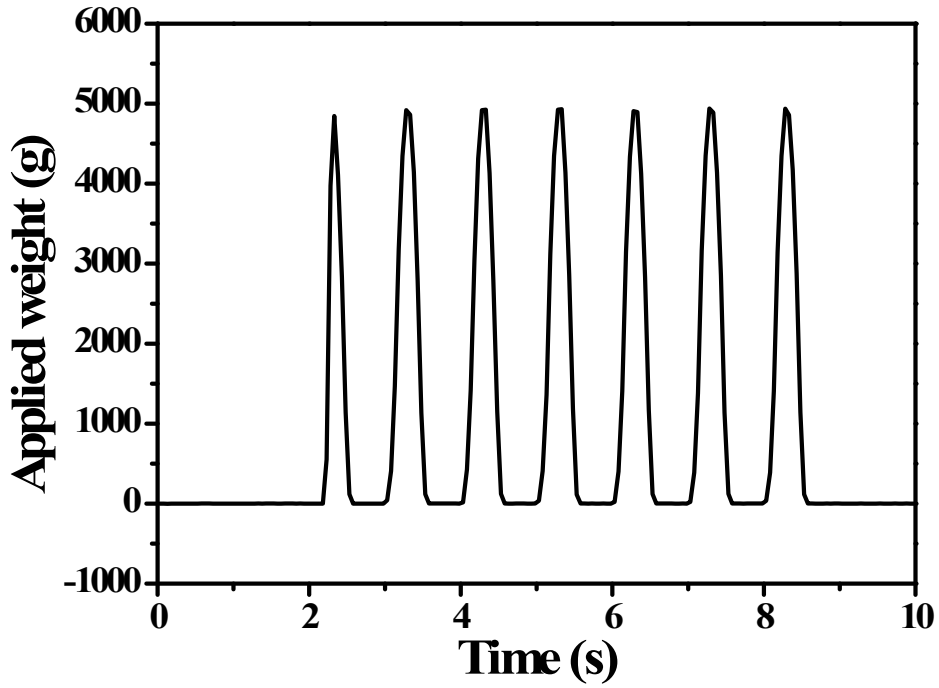

Fig. S8. Graph of force applied by force machine.

Force F=ma

m: Weight, a: Gravity constant=9.8m/s^2

Pressure P=F/S

F: Force, S: Force area=1cm^2

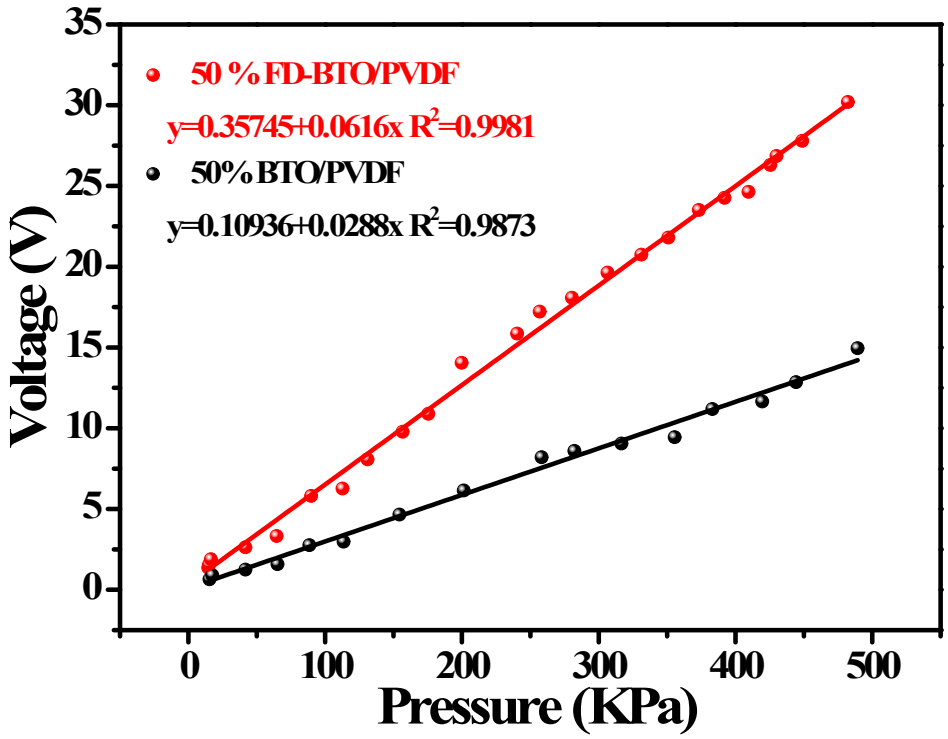

Fig. S9. The dependence of output voltage on applied pressure for different composite films

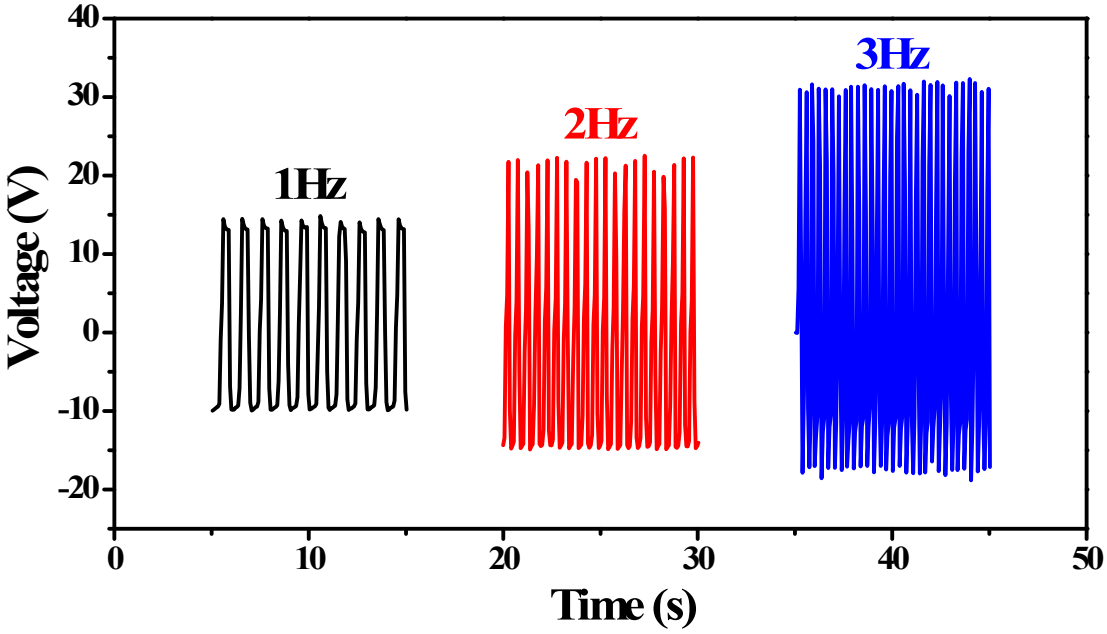

Fig. S10. Output voltages of printed sensor at different impacting frequencies under a constant pressure force of 50 N.