ELECTRONIC SUPPLEMENTARY INFORMATION (ESI)

Title: Hydroxylated $BiFeO_3$ as efficient fillers in poly(vinylidene fluoride) for flexible dielectric, ferroelectric, energy storage and mechanical energy harvesting application

Abhishek Sasmal[1], Aniket Patra[2], P. Sujatha Devi[3,*], Shrabanee Sen[1,*]

[1]Functional Materials and Devices Division, CSIR-Central Glass & Ceramic Research Institute, Kolkata-700032, India

[2]Electrical and Communication Engineering, Indian Institute of Science, Bangalore-560012, India

[3]Chemical Sciences and Technology Division, CSIR-National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram-695019, India

*E-mail:

P. Sujatha Devi (psujathadevi@niist.res.in)

Shrabanee Sen (shrabanee@cgcri.res.in)

Fig. S1

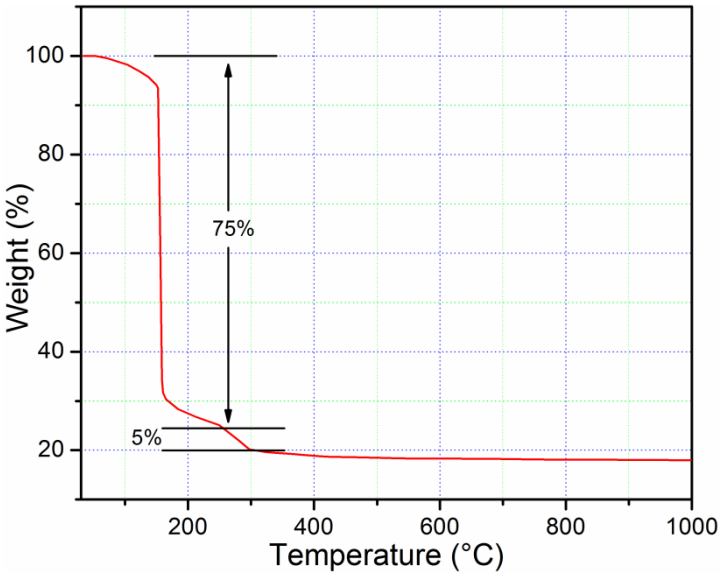

Fig. S1 TGA plot of the as synthesized dried gel of BFO.

Fig: S2

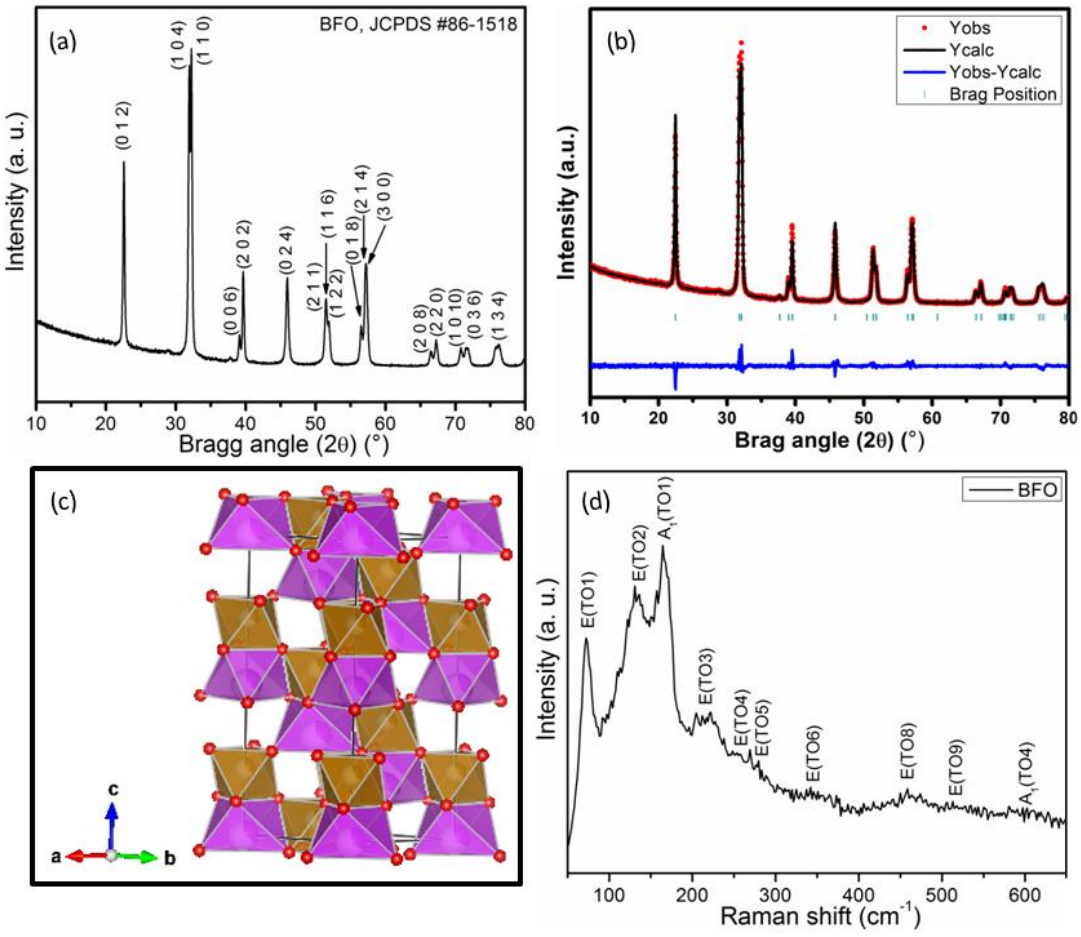

Fig. S2 (a) Indexed and (b) refined XRD pattern of the prepared BFO nanoparticles. (c) Crystallographic structure of the BFO nanoparticles. (d) Room temperature Raman spectra of BFO nanoparticles.

Table S1

Table S1 Refined lattice parameters and structure fitting factors.

Sample ID	**BFO**
Space group	R3c
Lattice Parameters	
a (Å)	5.5769
c (Å)	13.8647
Cell Volume ($Å^3$)	373.448
Atomic positions	
Bi (x, y, z) (6a)	0, 0, 0
Fe (x, y, z) (6a)	0, 0, 0.2217
O (x, y, z) (18b)	0.4297, 0.0070, 0.9546
Fitting factors	
R_p (%)	12.1
R_{wp} (%)	10.4
χ^2	2.42
Selected bond lengths (Å)	
Fe-O	1.9273
Fe-O	2.1430
Selected bond angles (°)	
Fe-O-Fe	153.6158

Fig. S3

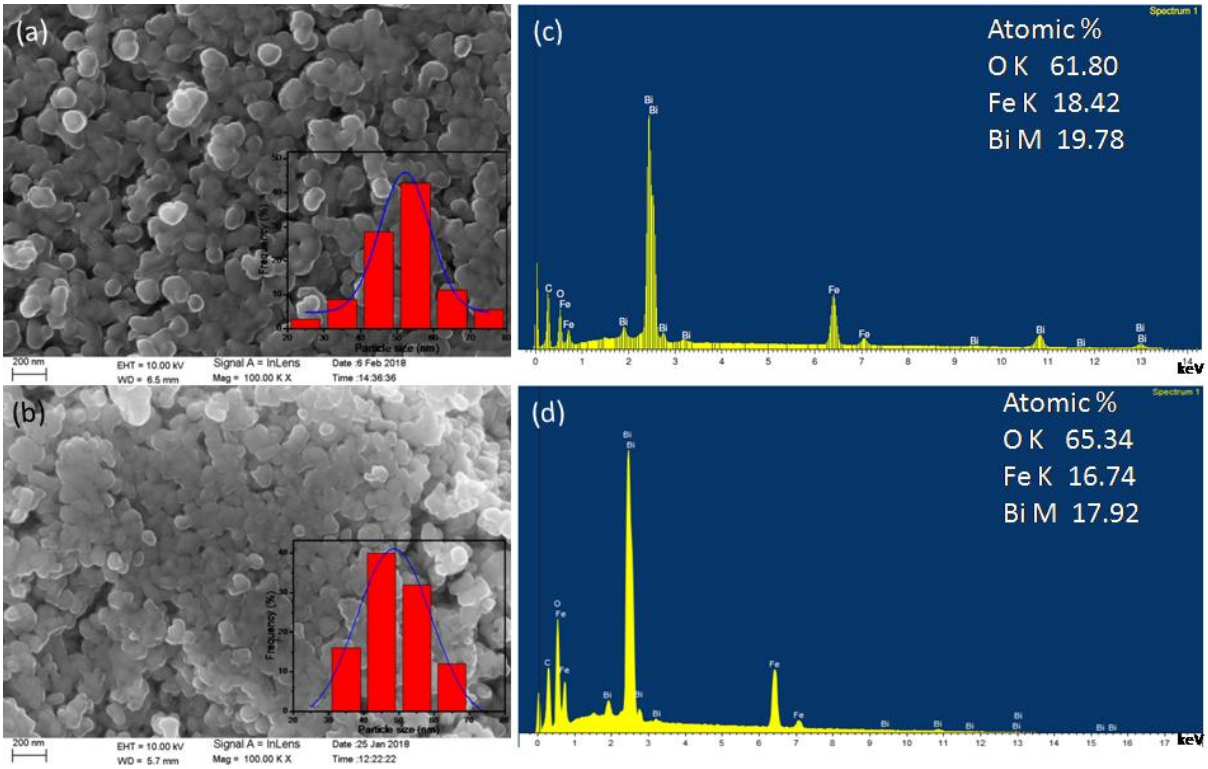

Fig. S3 (a-b) FESEM image (inset: particle size distribution) and (c-d) EDS spectra of BFO and BFOH nanoparticles, respectively.

Fig. S4

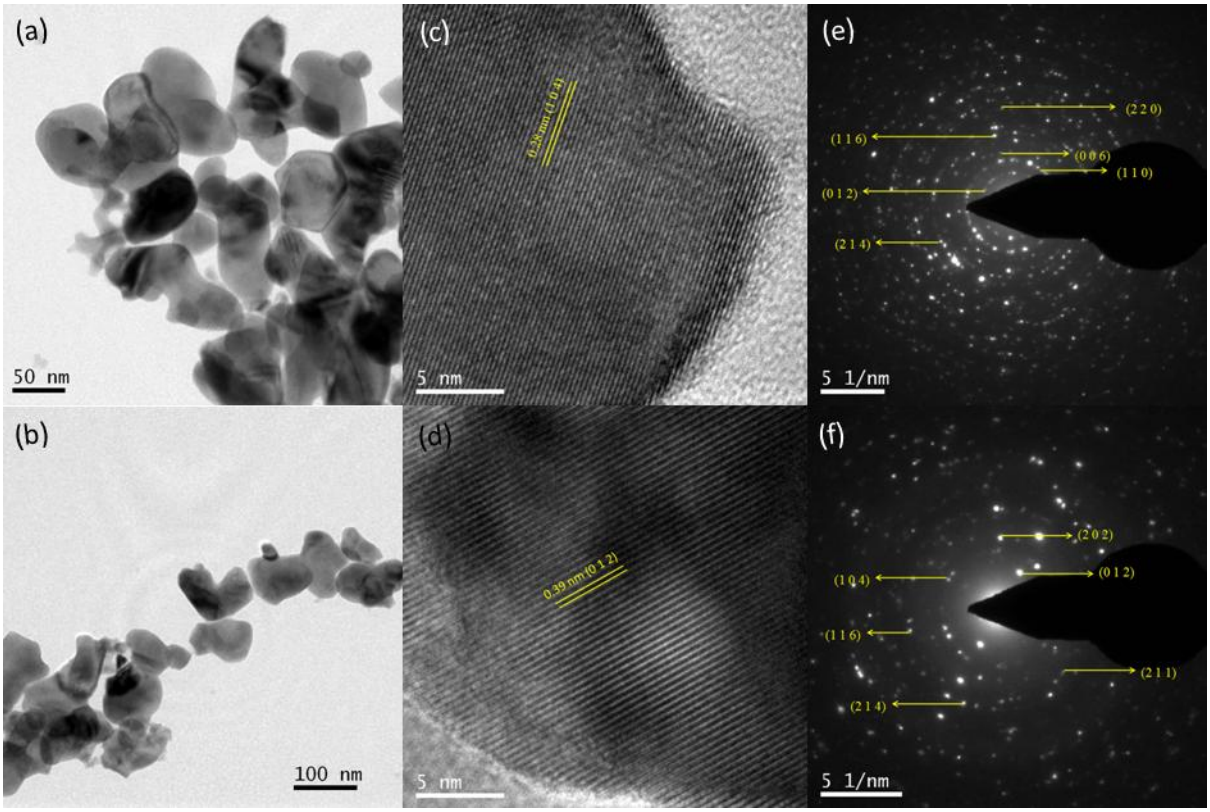

Fig. S4 (a-b) Bright field TEM images (c-d) HRTEM images and (e-f) SAED patterns of BFO and BFOH nanoparticles, respectively.

Fig. S5

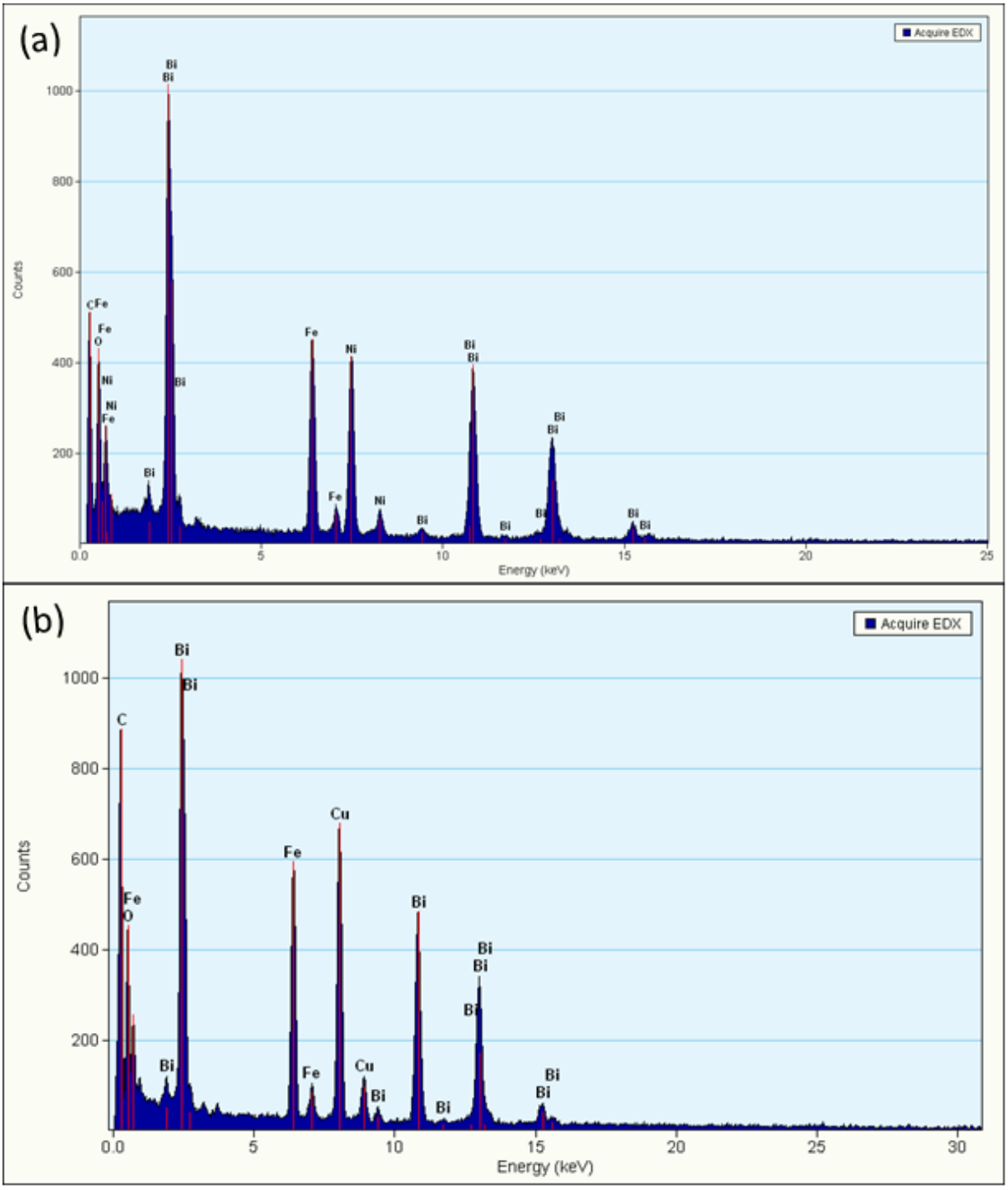

Fig. S5 EDS spectra of (a) BFO and (b) BFOH nanoparticles.

Fig. S6

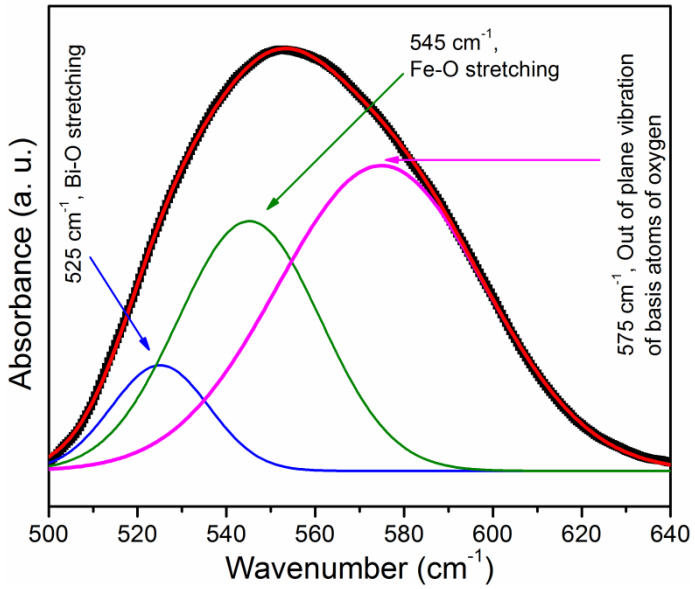

Fig. S6 Deconvoluted FTIR absorption band of BFO nanoparticles around 555 cm^{-1}.

Fig. S7

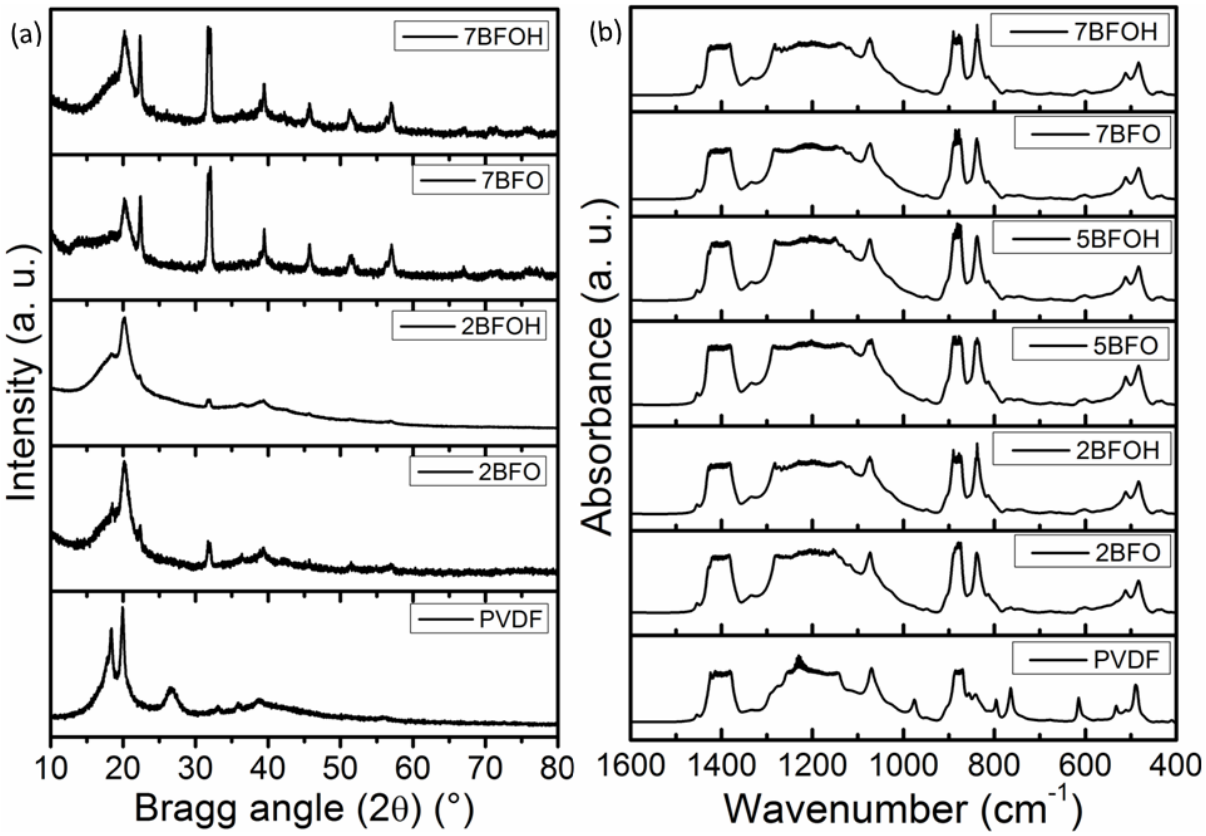

Fig. S7 (a) XRD patters (with 2θ ranging from 10 to 80°) and (b) FTIR absorption spectra (with wavenumber ranging from 1600-400 cm^{-1}) of all the composite films.

Fig. S8

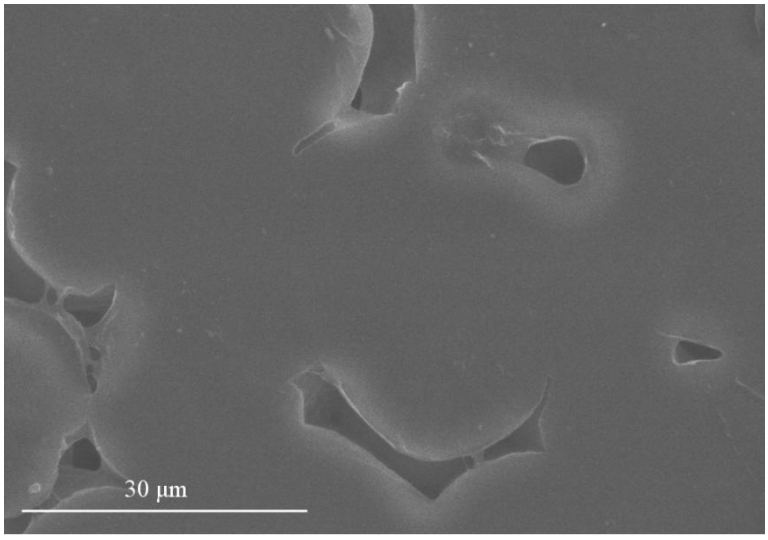

Fig. S8 SEM image of bare PVDF.

Fig. S9

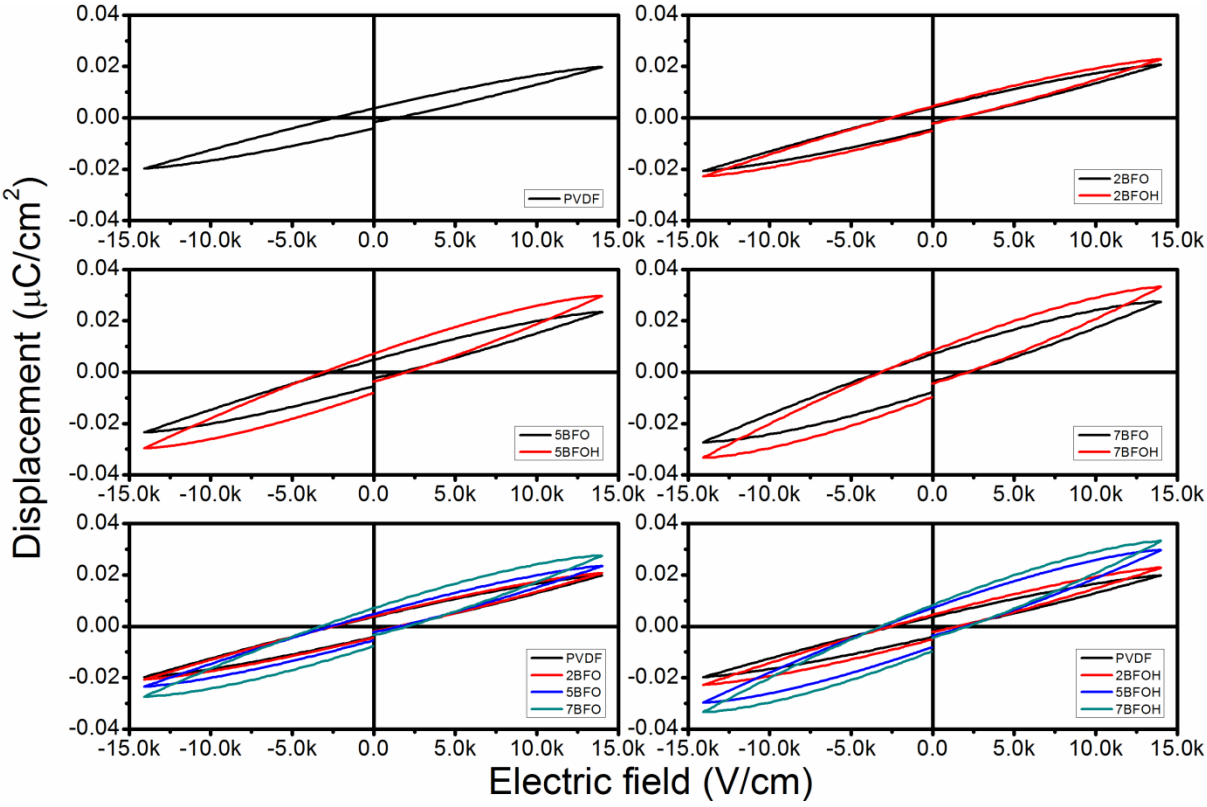

Fig. S9 Comparison of D-E hysteresis loops of all the films in different ways.

Fig. S10

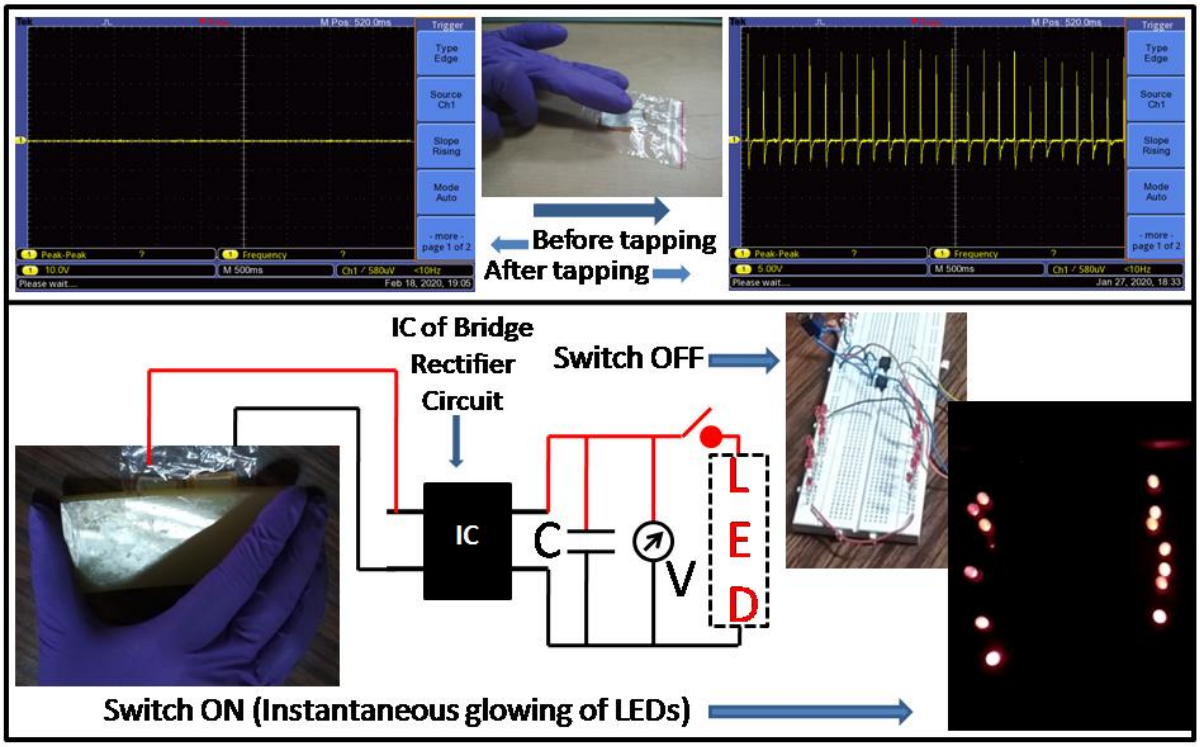

Fig. S10 Schematic presentation of mechanical energy harvesting, capacitor charging and LED glowing experiments.

Fig. S11

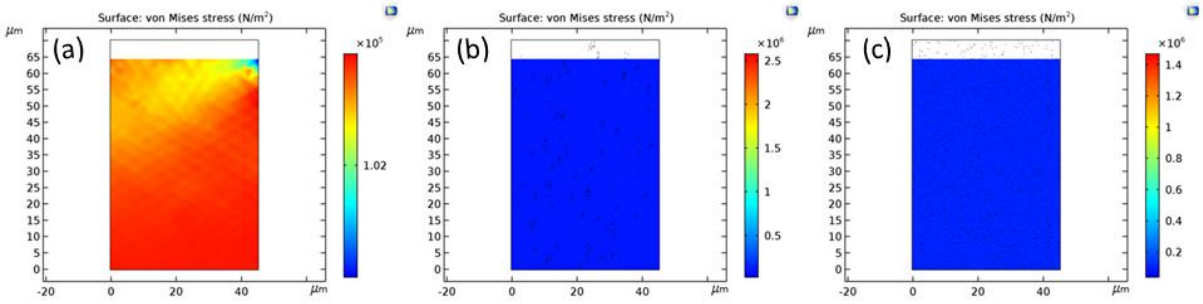

Fig. S11 The colour map surface plot is showing the stress distribution in the cross section of (a) bare PVDF, (b) 7BFO and (c) 7BFOH films due to normally applied 0.3MPa pressure.