

Piezophototronic Modulation in 2D Ruddlesden–Popper Perovskites: A Pathway to Strain–Light Synergistic Self-Powered Intelligent Sensing

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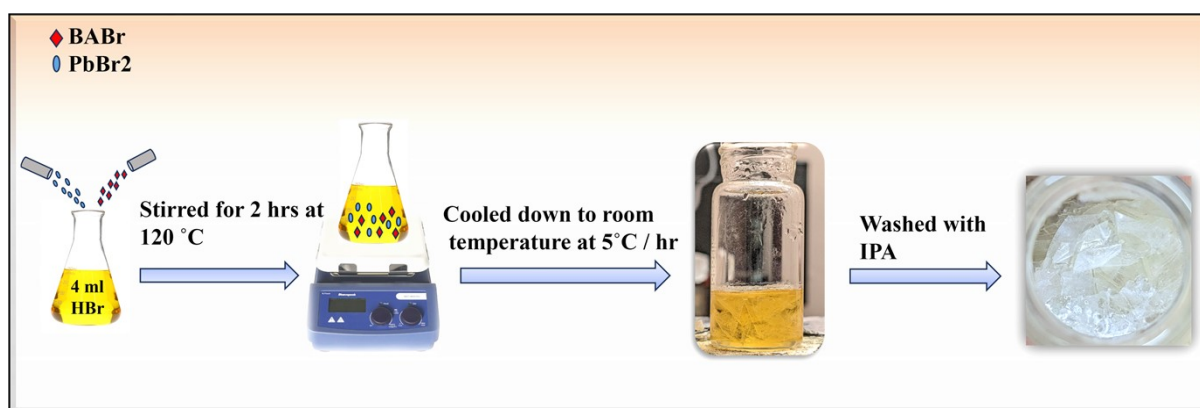


Fig. S1: Schematic diagram of synthesis process of BA_2PbBr_4 perovskites via solution-based method.

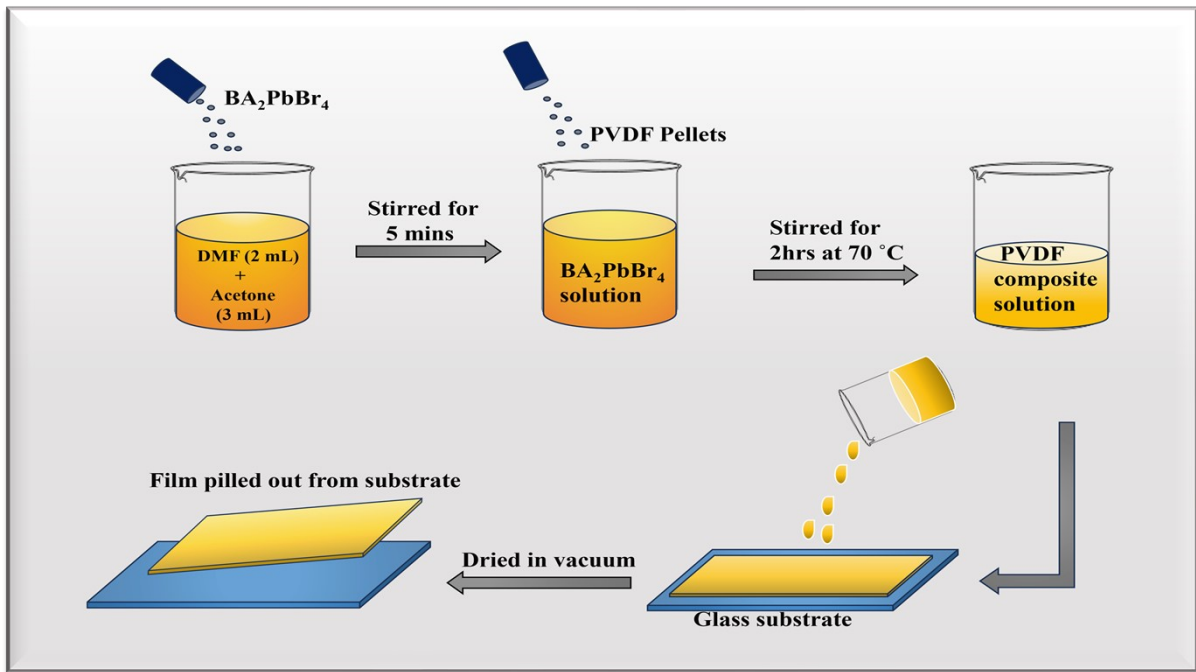


Fig. S2: Schematic diagram of synthesis process of PVDF/ BA₂PbBr₄ composite film.

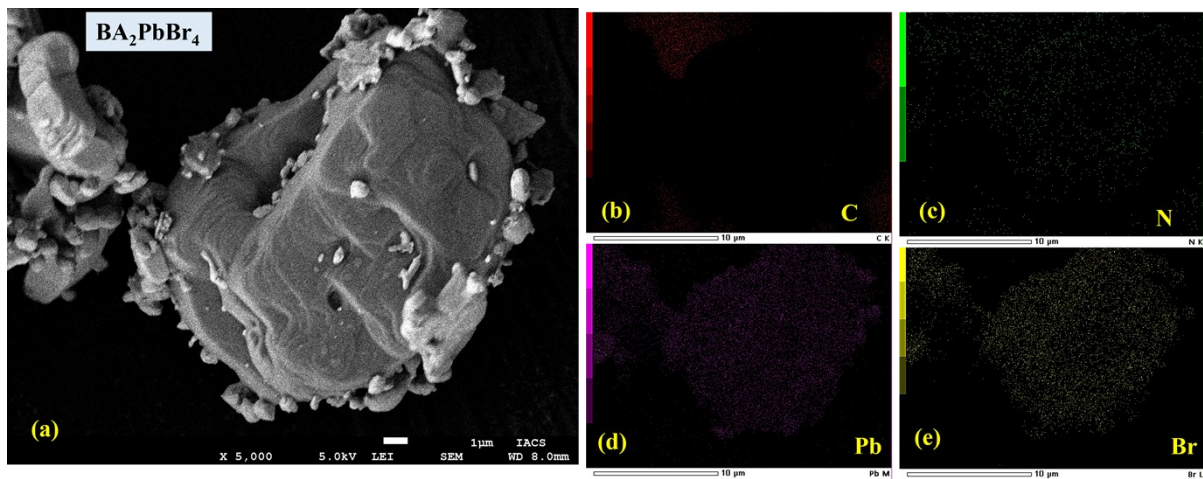


Fig. S3: (a) SEM image of BA₂PbBr₄, (b-e) EDX elemental mapping of the constituent elements of BA₂PbBr₄ perovskite

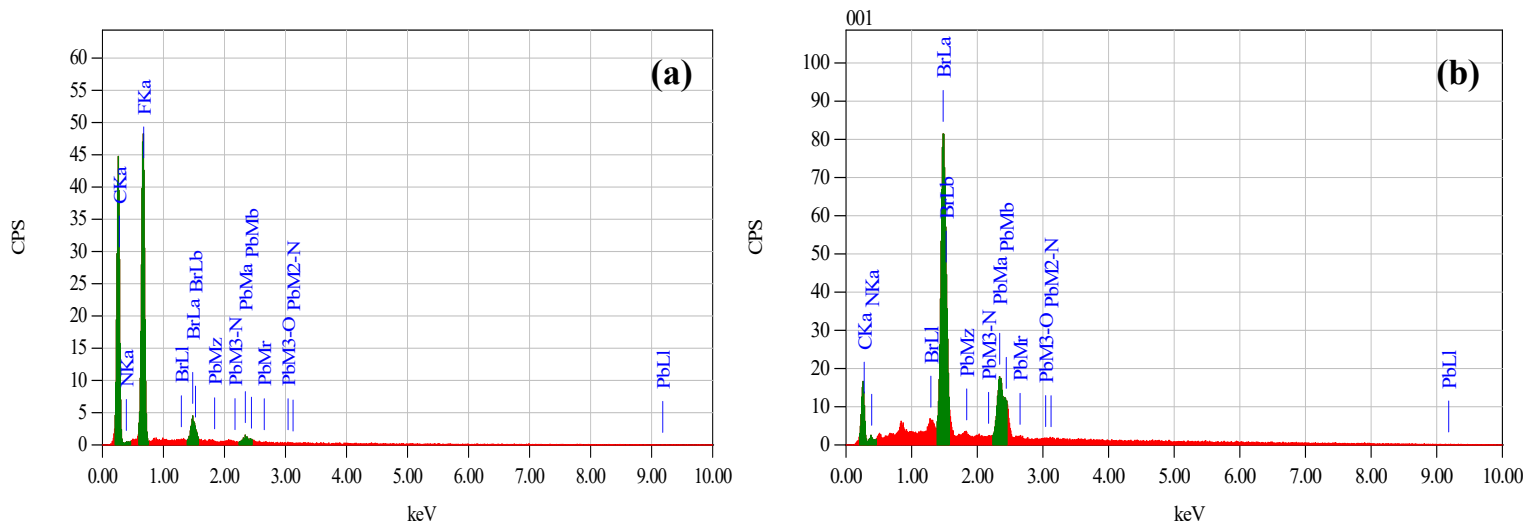


Fig. S4: (a, b) EDX spectra of BA_2PbBr_4 and PVDF/ BA_2PbBr_4 composite film

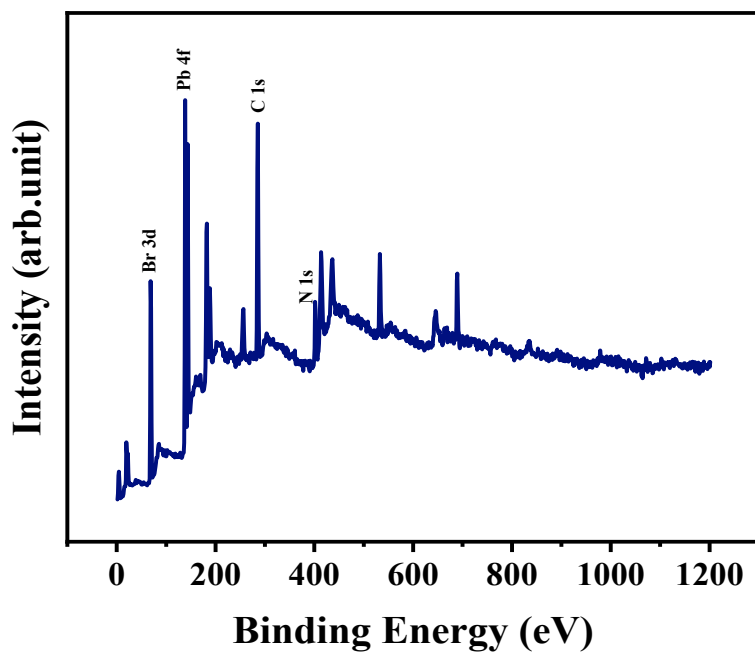


Fig. S5: XPS survey spectra of BA_2PbBr_4 showing all the constituent elements.

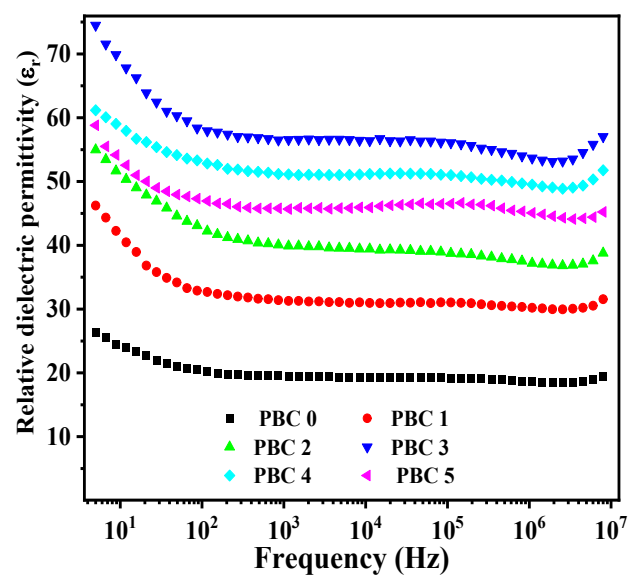


Fig. S6: Frequency dependent relative dielectric permittivity of PVDF/ BA_2PbBr_4 composites.

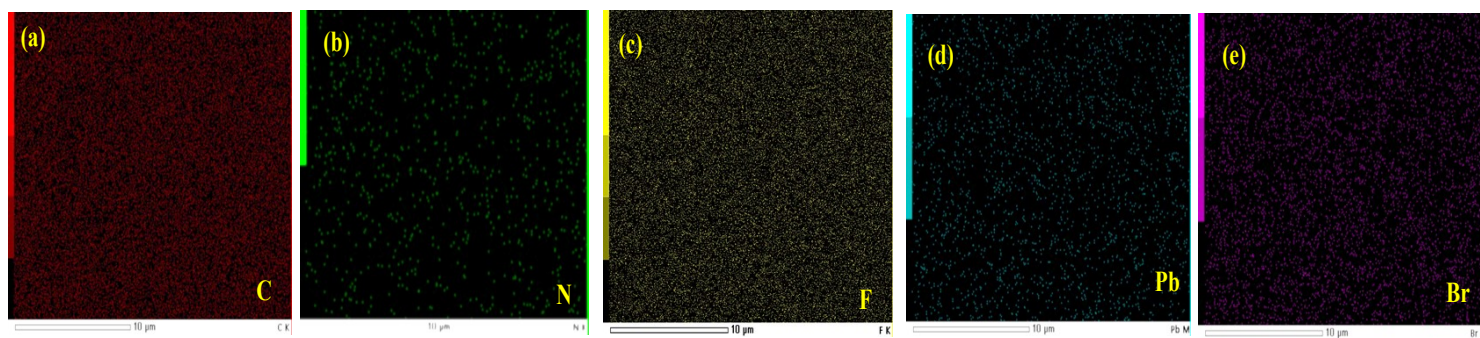


Fig. S7 : (a-e) EDX elemental mapping of the constituent elements (C, N, F, Pb and Br) of PBC3.

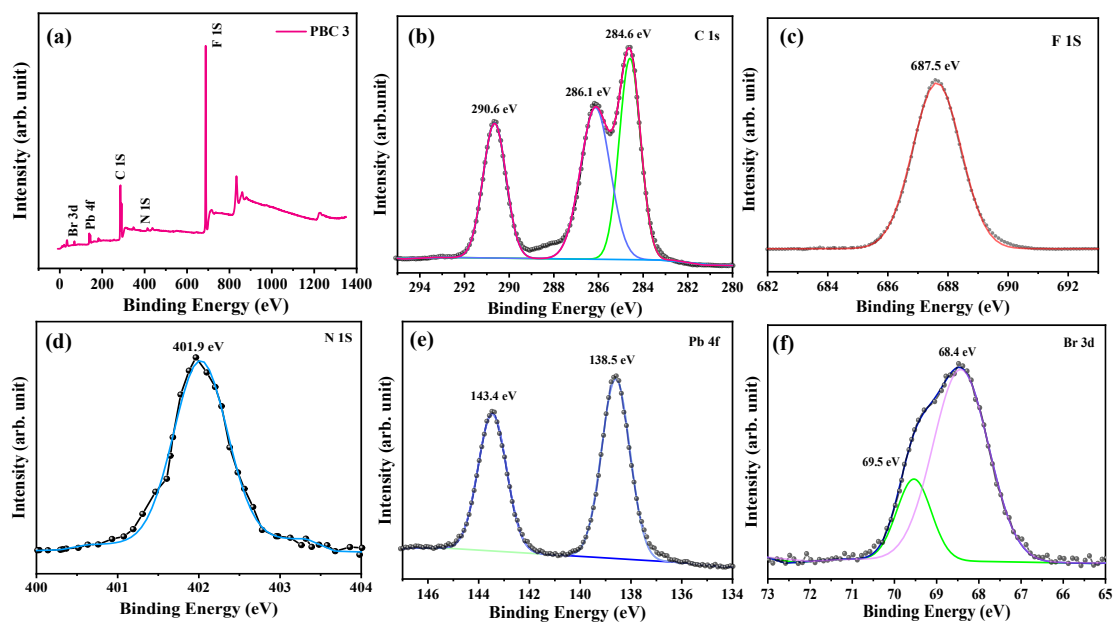


Fig. S8 : Core level XPS spectra of PBC 3: (a) Survey spectra, (b) C, (c) F, (d) N, (e) Pb, (f) Br.

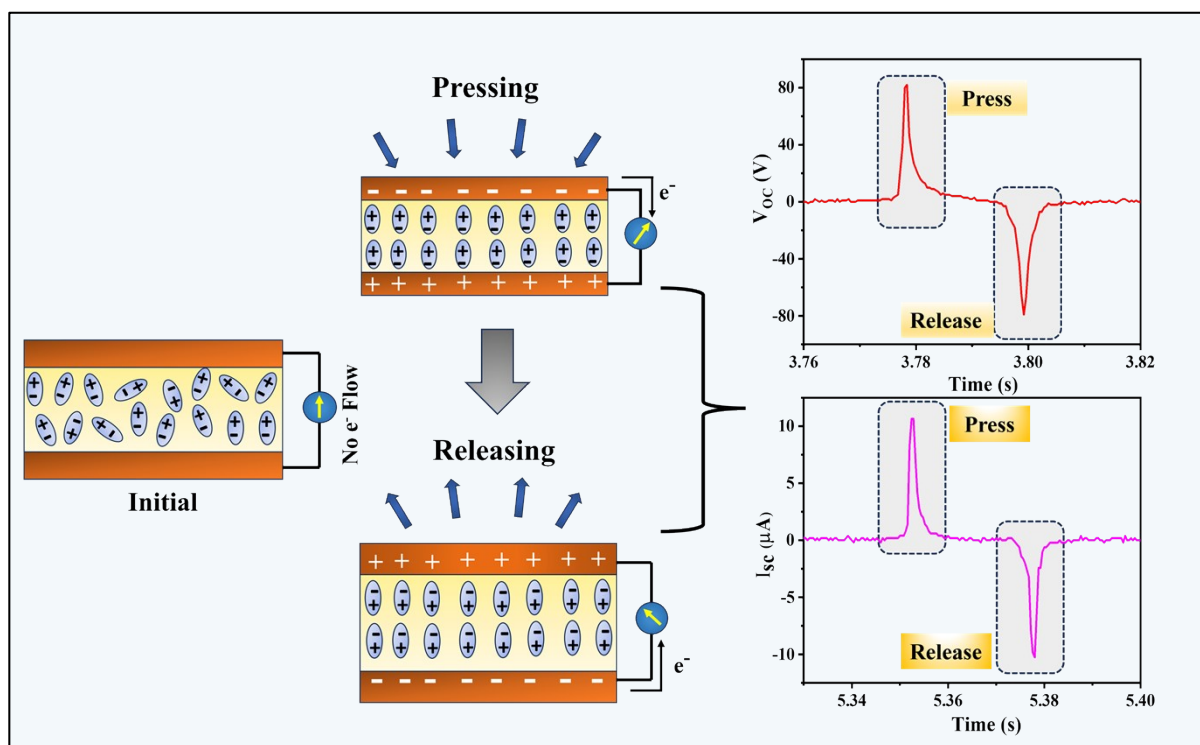


Fig. S9 : Schematic of the working mechanism of the nanogenerator device during initial, pressing and releasing condition with an enlarged view of open circuit voltage and short circuit current during pressing and releasing.

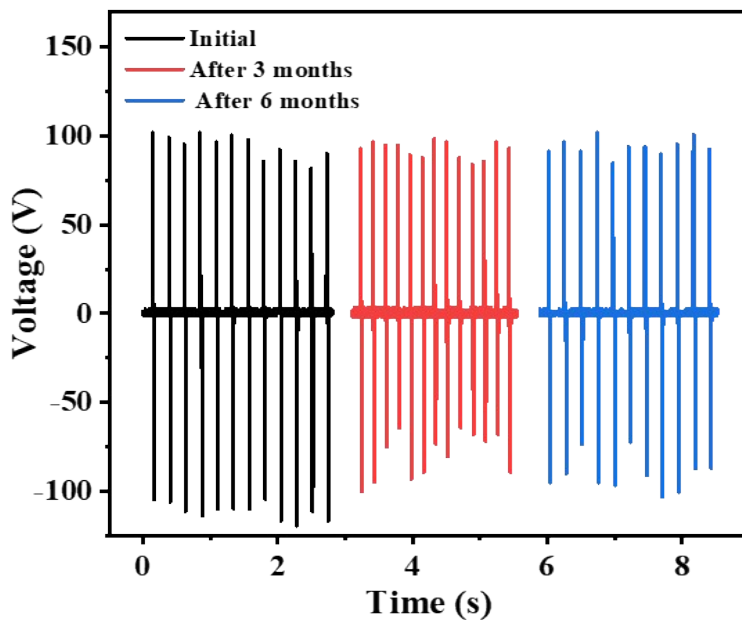


Fig. S10: Output voltage data on first day, after 3 months and after 6 months.

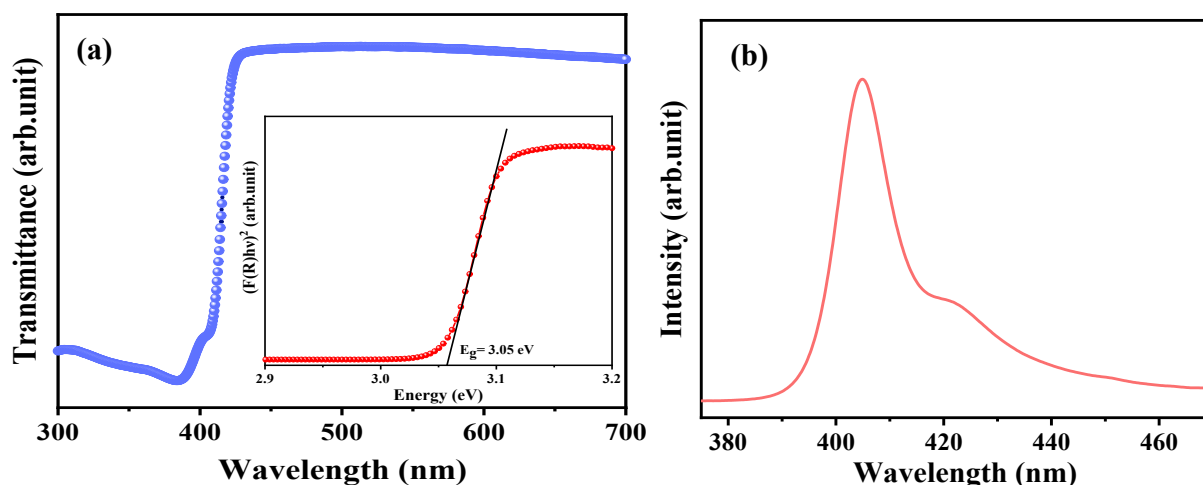


Fig. S11: (a) Tauc plots showing band gap, (b) PL spectra of of PBC 3 film.

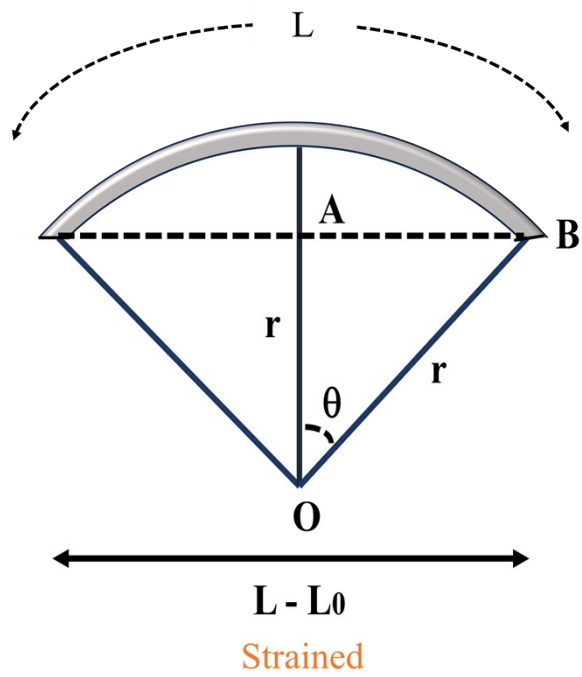


Fig. S12: Schematic representation for the strain calculation of the film in strained condition

The equation (3) mentioned in the main manuscript is derived as:

In Fig. S10, ΔOAB gives the relation,

$$L = r \cdot (2\theta)$$

$$\sin\theta = \frac{(L - L_0)/2}{r}$$

$$\text{or, } \sin\left(\frac{L}{2r}\right) = \frac{L - L_0}{2r}$$

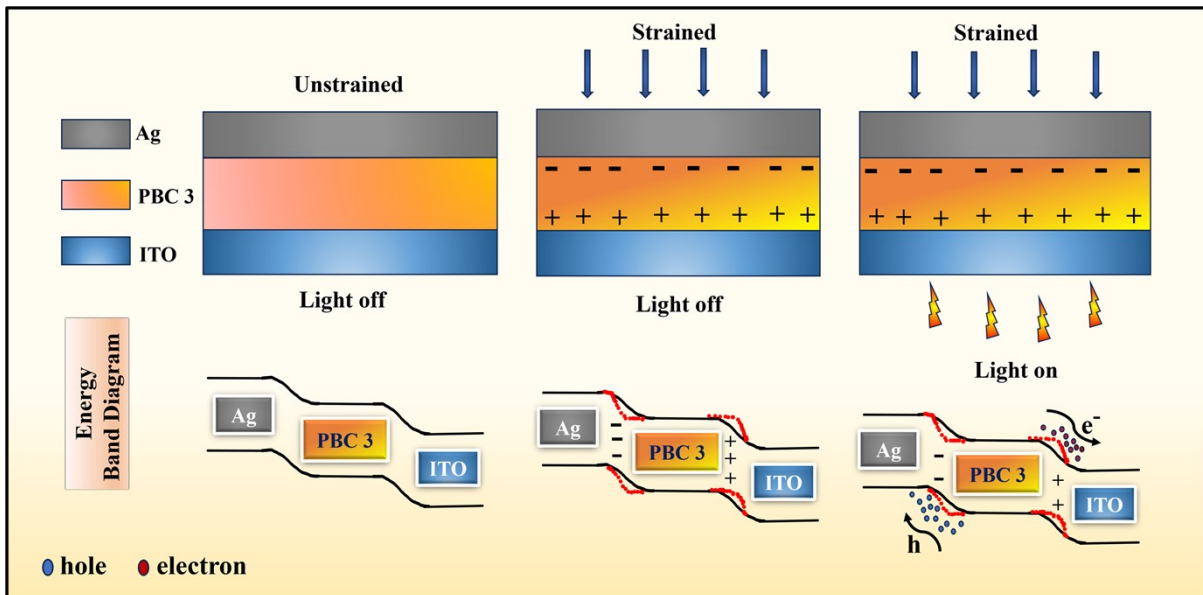


Fig. S13 : Schematic structure and band diagram of the piezophototronic device under different mechanical and optical conditions.