

## Supporting Information

### **ZnAl-LDH-induced electroactive $\beta$ -phase and controlled dielectrics of PVDF for high-performance triboelectric nanogenerator for humidity and pressure sensing applications**

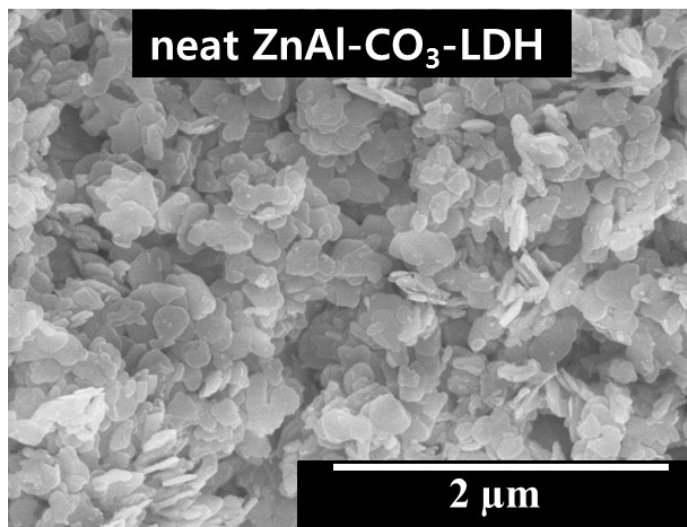
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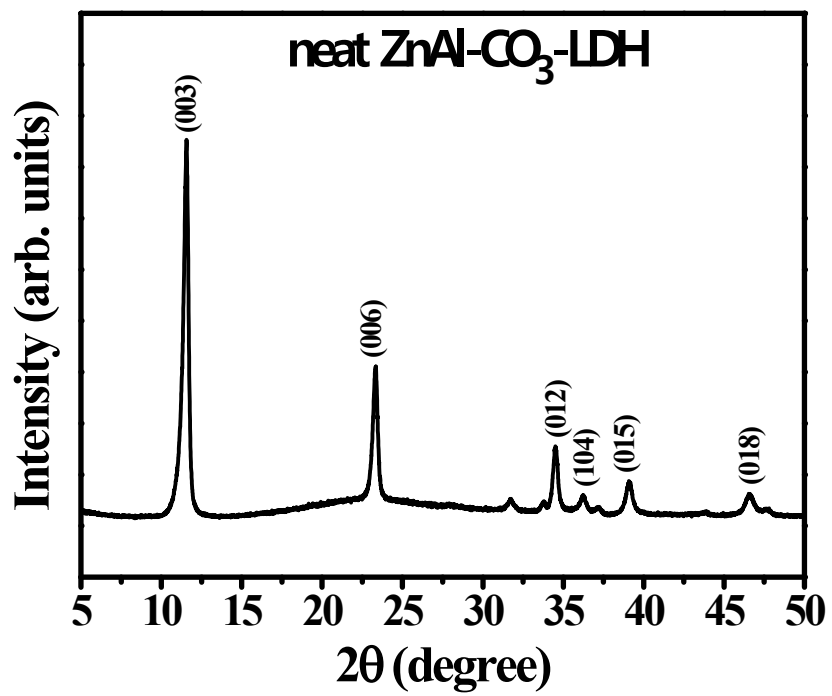
<sup>2</sup>School of Electrical Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, Republic of Korea.

\*Corresponding authors

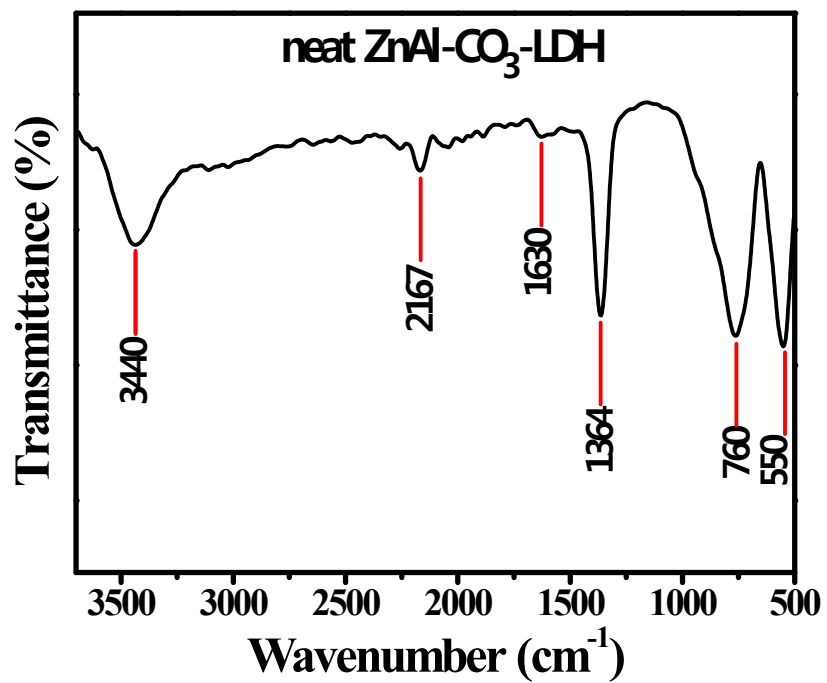
E-mail addresses: sgyoon@cnu.ac.kr (S-G. Yoon), venkatrajujella@gmail.com (V. Jella)



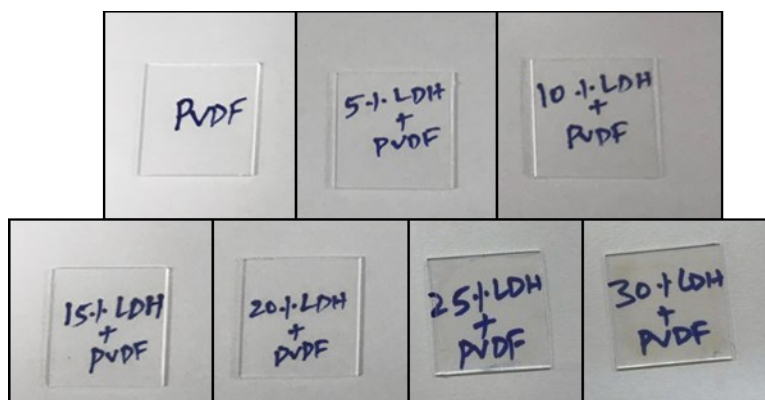
**Figure S1.** Surface morphology of neat ZnAl-CO<sub>3</sub>-LDH film



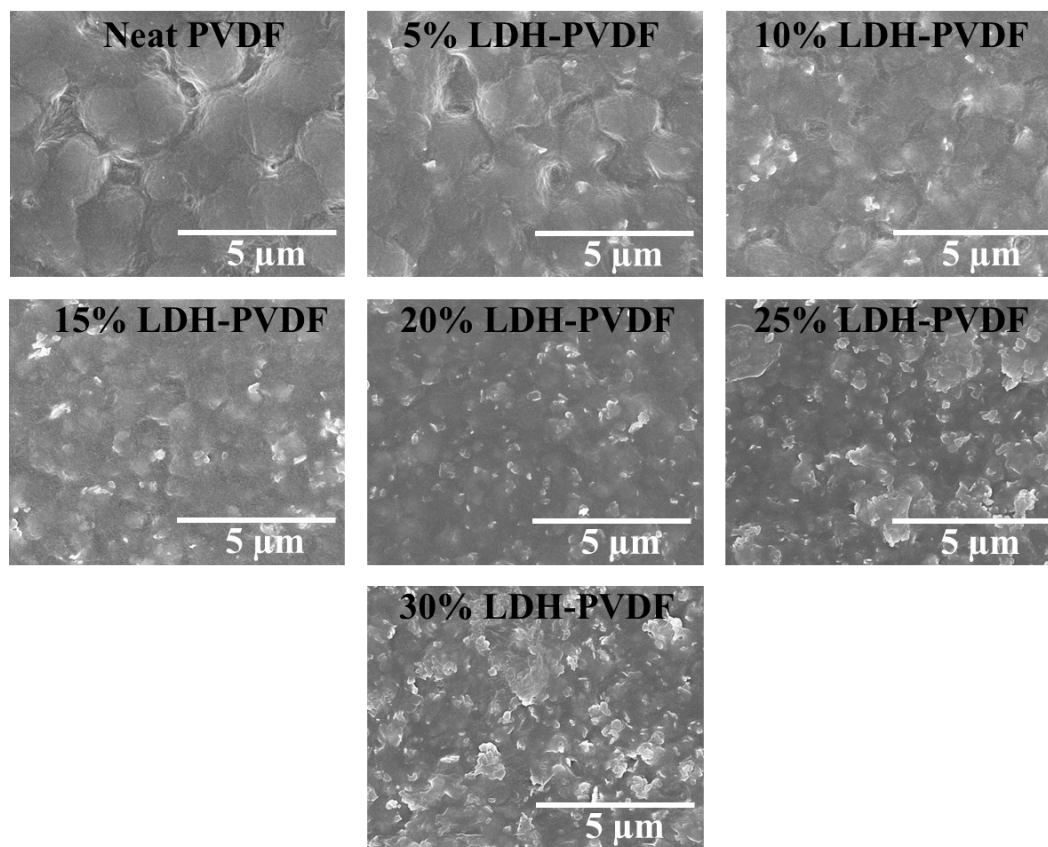
**Figure S2.** XRD pattern of neat ZnAl-CO<sub>3</sub>-LDH film.



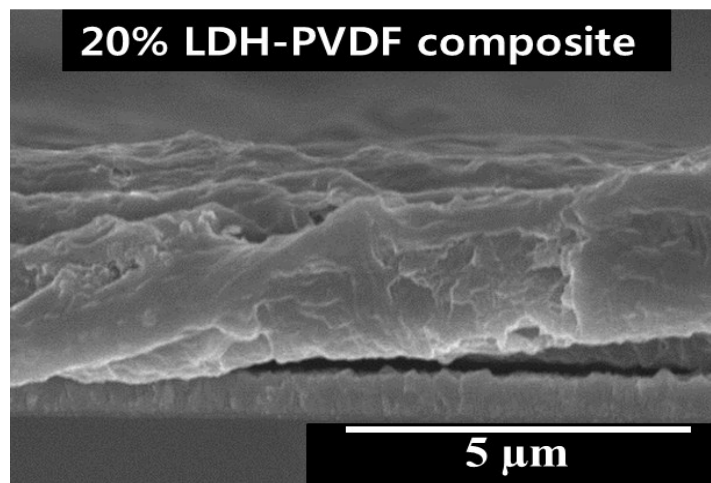
**Figure S3.** FTIR spectrum of neat ZnAl-CO<sub>3</sub>-LDH film.



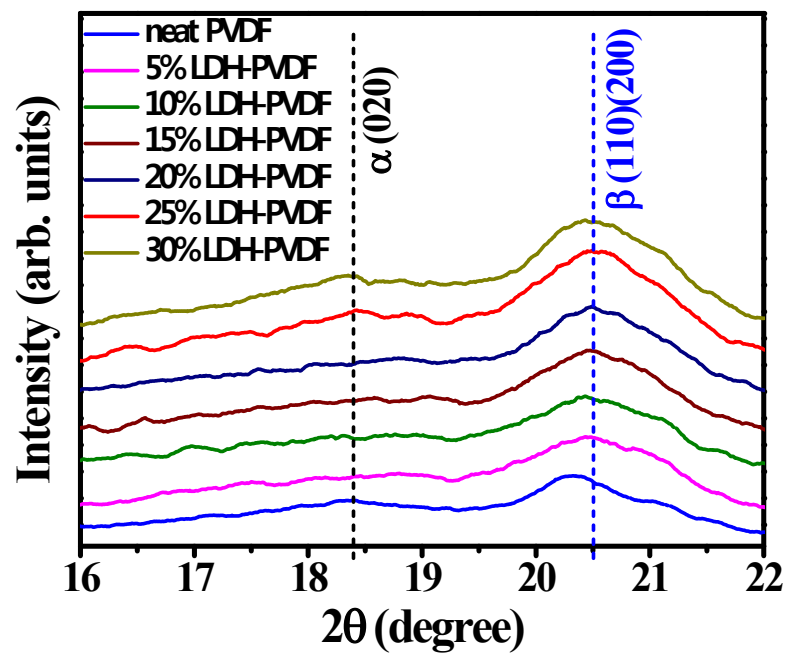
**Figure S4.** The captured photographs of ZnAl-LDH-PVDF composite films prepared on glass substrate with different loading amounts of Zn-Al-LDH (0 to 30 wt%).



**Figure S5.** The SEM-surface images of ZnAl-LDH-PVDF composite films prepared on glass substrate with different loading amounts of Zn-Al-LDH (0 to 30 wt%).

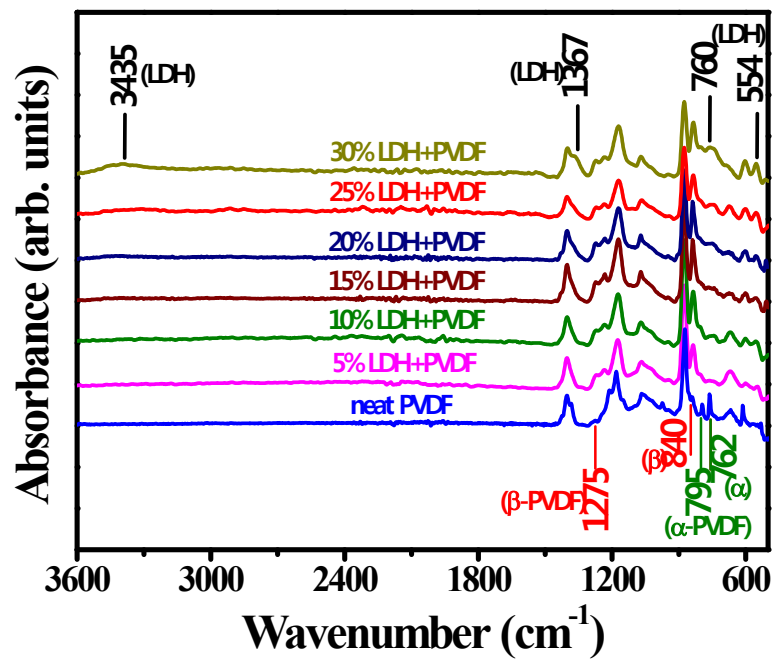


**Figure S6.** Cross-sectional SEM image of 20 wt% ZnAl-LDH-PVDF composite film.

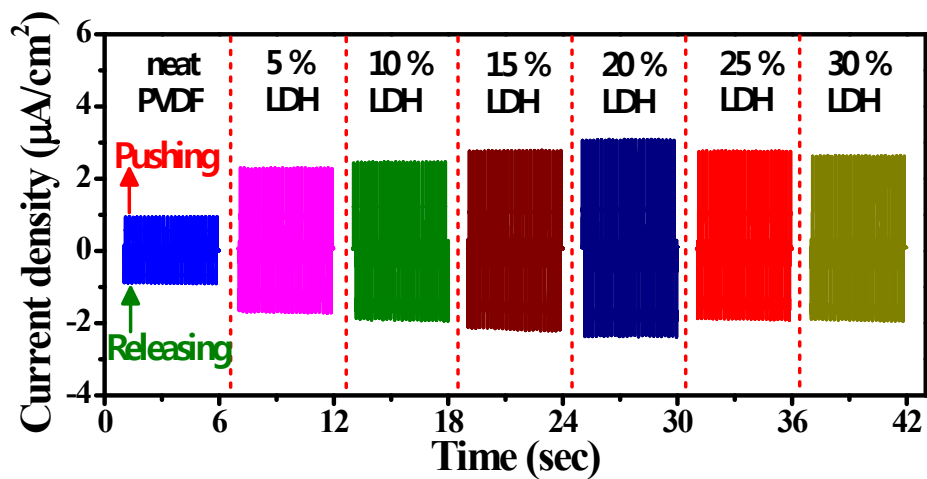


**Figure S7.** Enlarged view of XRD patterns of ZnAl-LDH-PVDF composite films with various LDH loading amounts.

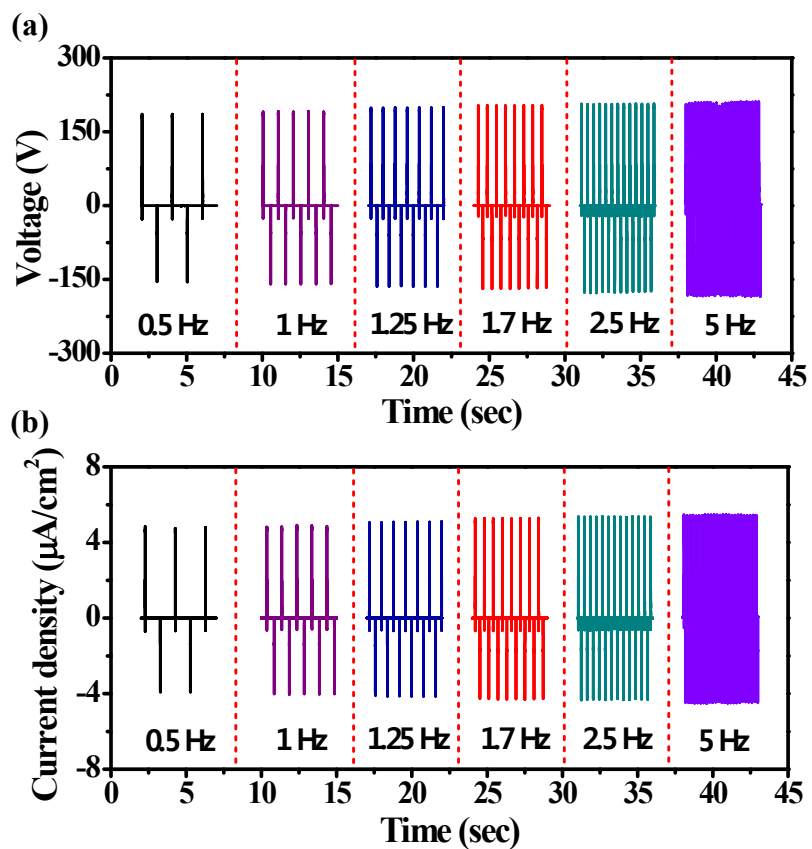




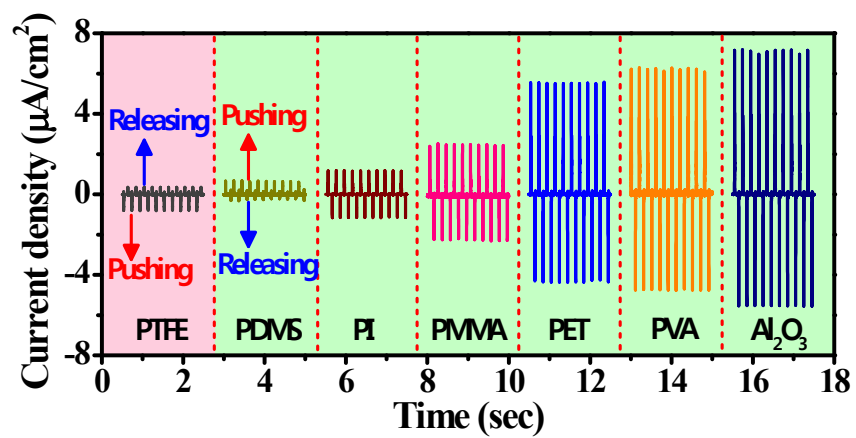
**Figure S8.** FTIR spectra of ZnAl-LDH-PVDF composite films with various LDH loading amounts.



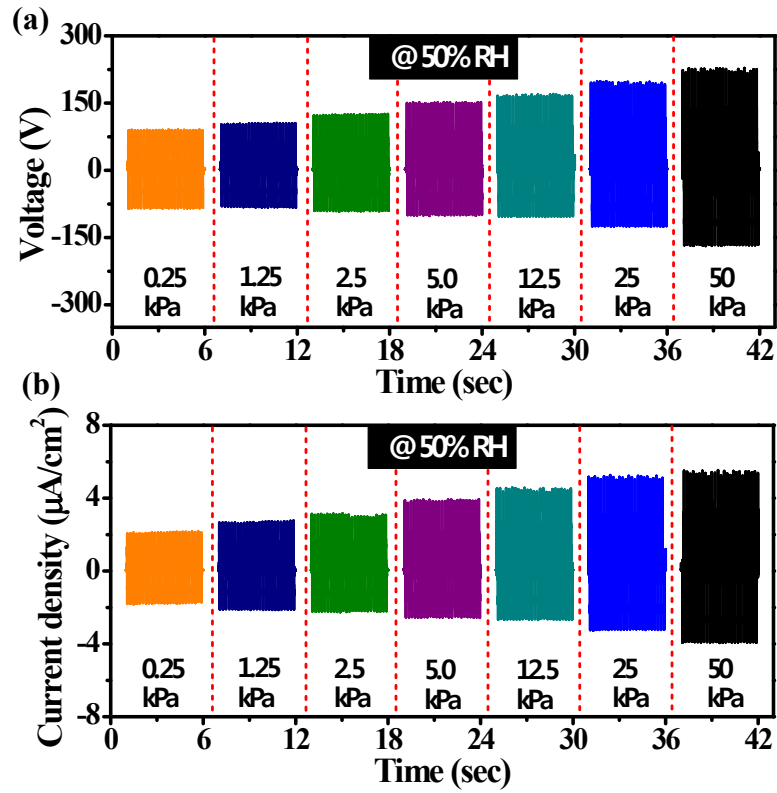
**Figure S9.** Dependence of ZnAl-LDH content (0 to 30 wt%) on generation of output current density from ZnAl-LDH-PVDF composite based TENGs under an applied pressure/frequency of 2.5 kPa/5 Hz.



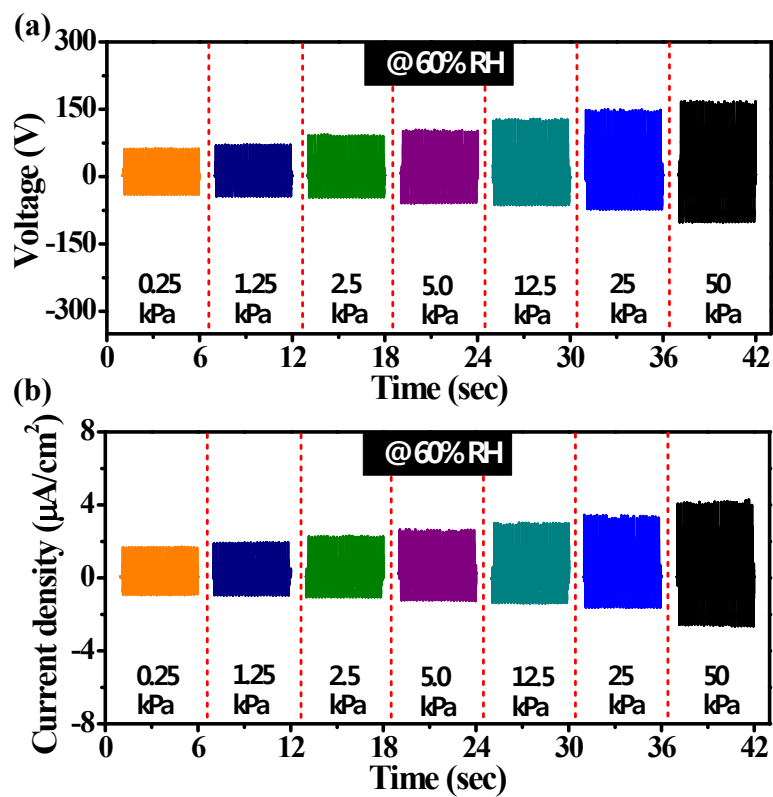
**Figure S10.** Frequency dependent output a) voltage and b) current density of 20 wt% ZnAl-LDH-PVDF composite TENG measured under a constant applied pressure of 50 kPa.



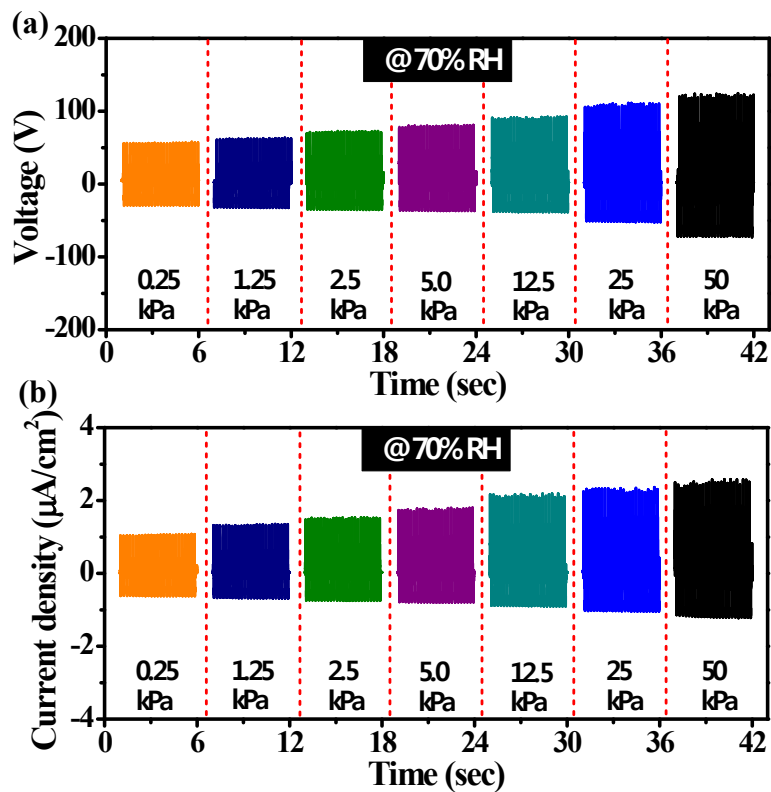
**Figure S11.** Output current density signals of various TENGs constructed using 20 wt% ZnAl-LDH-PVDF composite film and different materials as counter parts at an applied pressure/frequency of 50 kPa/5 Hz.



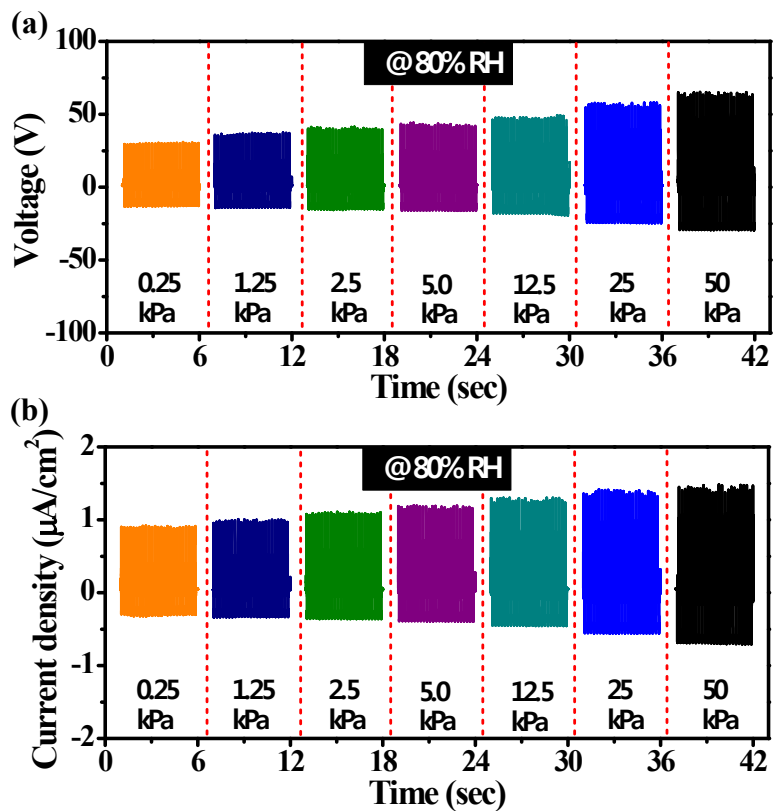
**Figure S12.** Pressure dependent output a) voltage and b) current density of 20 wt% ZnAl-LDH-PVDF composite TENG measured at constant RH of 50%.



**Figure S13.** Pressure dependent output a) voltage and b) current density of 20 wt% ZnAl-LDH-PVDF composite TENG measured at constant RH of 60%.

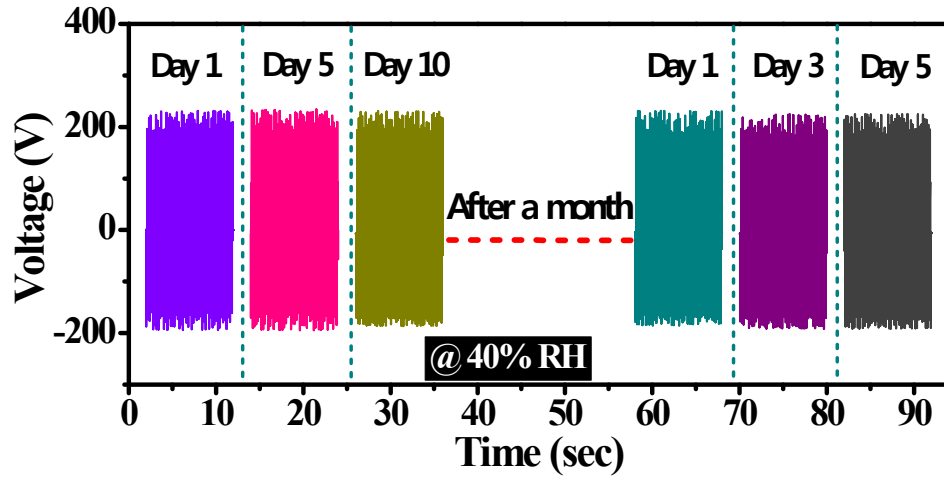


**Figure S14.** Pressure dependent output a) voltage and b) current density of 20 wt% ZnAl-LDH-PVDF composite TENG measured at constant RH of 70%.



**Figure S15.** Pressure dependent output a) voltage and b) current density of 20 wt% ZnAl-LDH-PVDF composite TENG measured at constant RH of 80%.





**Figure S16.** Long-term stability of 20 wt% ZnAl-LDH-PVDF composite TENG measured under an applied pressure/frequency of 50 kPa/5 Hz and a constant RH of 40% over a period of time.

## Videos

**Video S1.** Powering of commercial green LEDs by the generated output power from 20 wt% ZnAl-LDH-PVDF composite TENG under an applied pressure/frequency of 50 kPa/5 Hz at 40% RH.

**Video S2.** Powering of commercial green LEDs by the generated output power from 20 wt% ZnAl-LDH-PVDF composite TENG under an applied pressure/frequency of 50 kPa/5 Hz at 80% RH.