Supporting Information

Exploring Piezoelectric and Piezophototronic Properties of Nanostructured LN-$ZnSnS_3$ for Photo Responsive Vibrational Energy Harvesting

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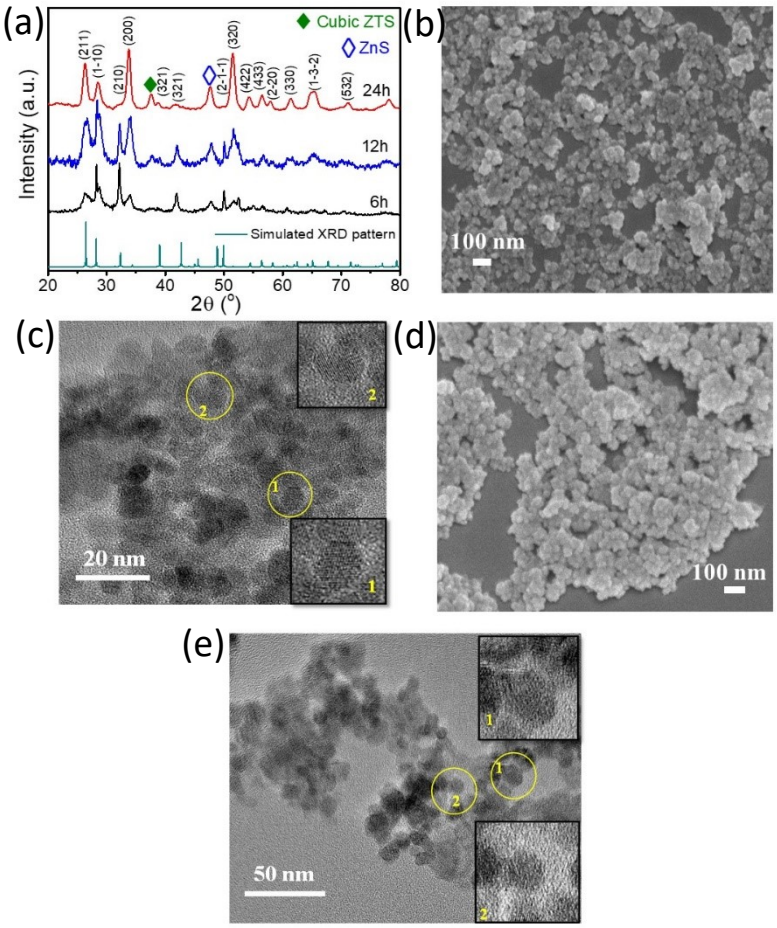

Fig. S1 (a) Comparison of x-ray diffraction patterns of as-synthesized LN-ZTS NCs at different reaction time at 220° C. SEM and TEM images for (b) and (c) 12 h reaction, (d) and (e) for 6 h reaction for ZTS products.

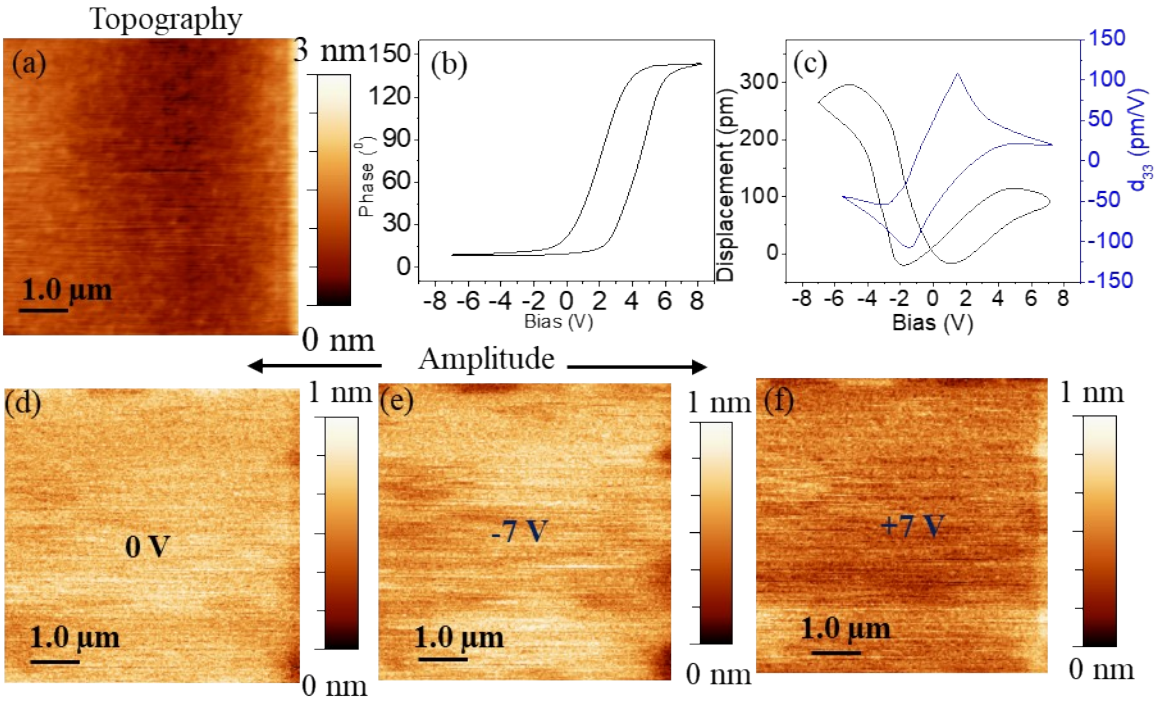

Fig. S2: (a) Topography image (b) Plot of the phase change of the LN-ZTS NCs film. (c) Butterfly loop and d_{33} plot. (d)-(e) amplitude images with the change of the bias voltage

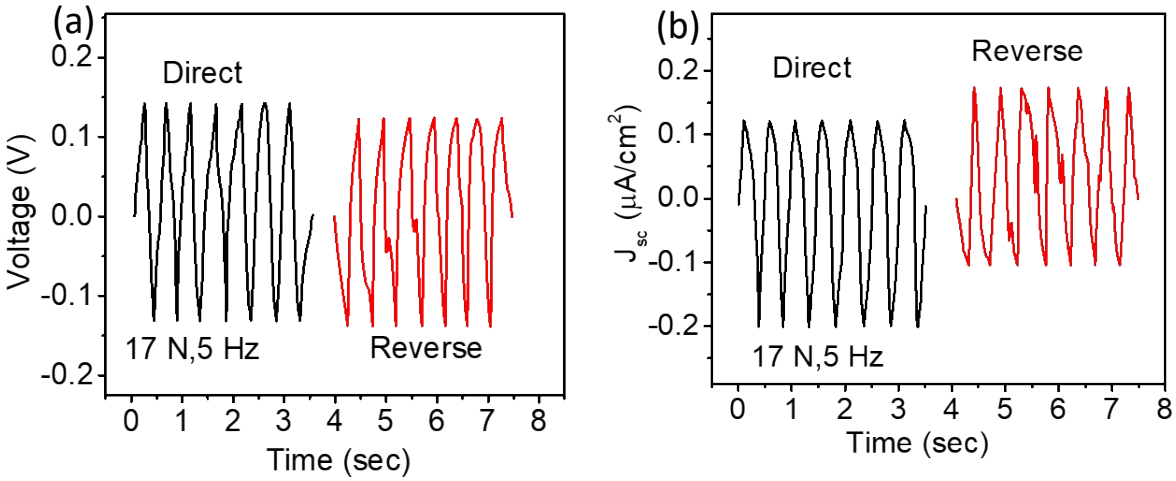

Fig. S3 Variation of (a) V_{oc} and (b) J_{sc} for direct and reverse connection from the LN-ZTS pellet at 17 N and 5 Hz.

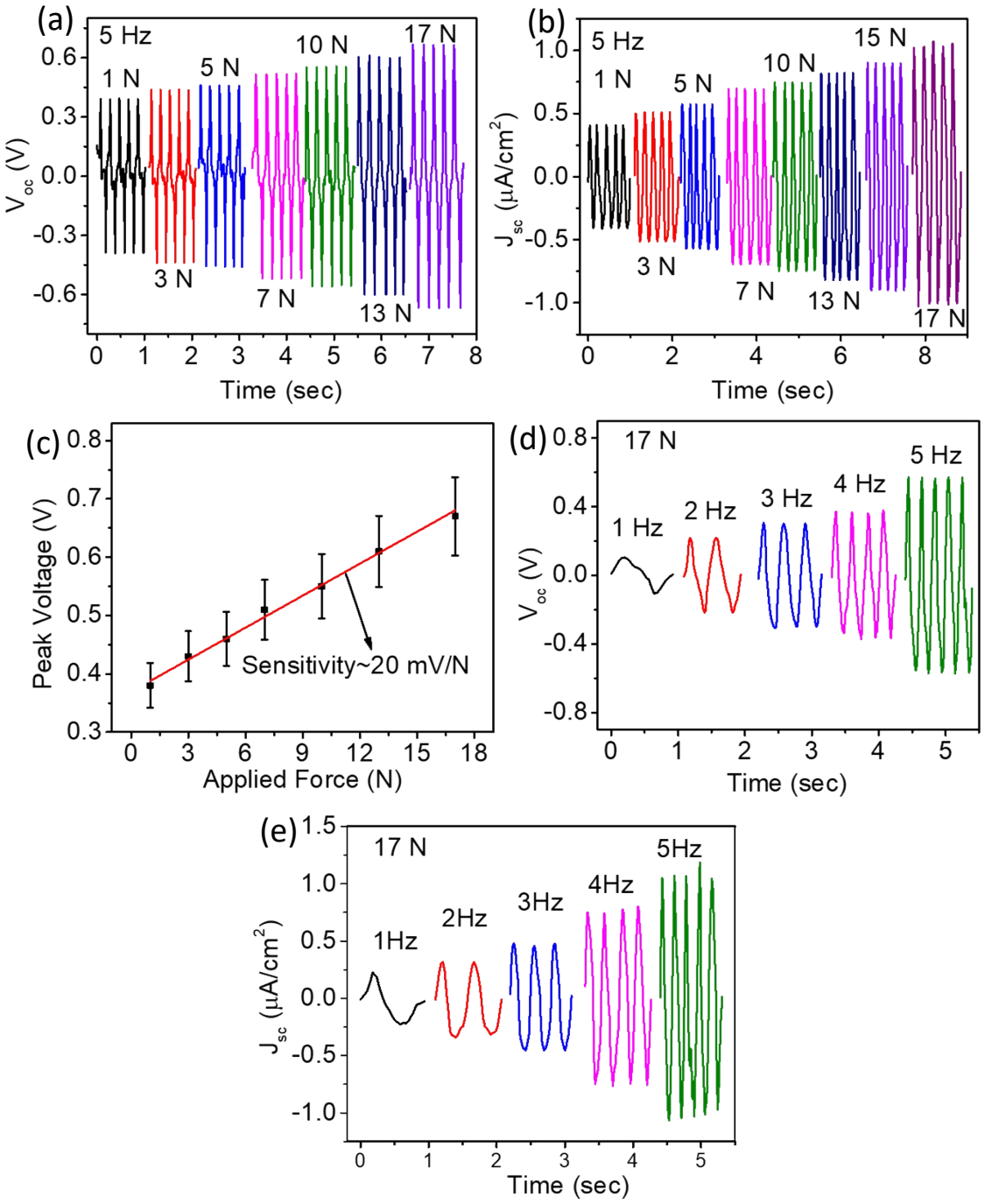

Fig. S4 (a and b) Variation of V_{oc} and J_{sc} with time under different applied forces at 5 Hz, (c) piezoelectric sensitivity showing the change in the peak voltage with applied force. (d and e) Variation of V_{oc} and J_{sc} with the time at different frequencies under 17 N applied force.

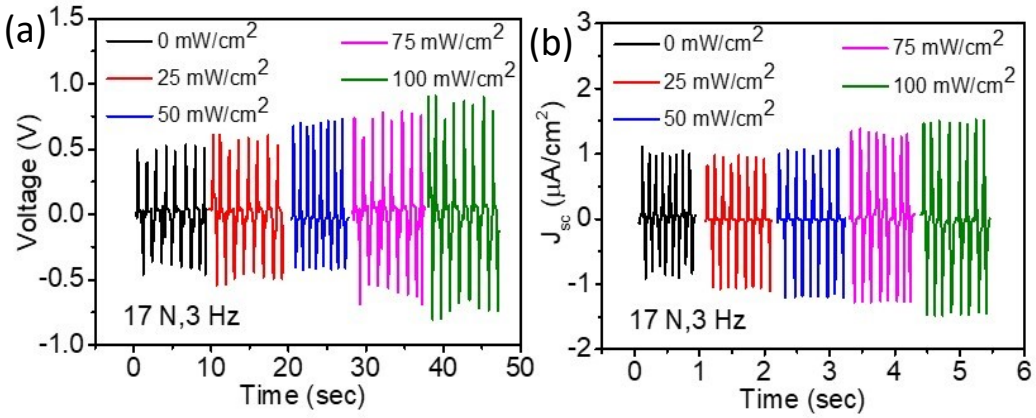

Fig. S5: (a) Changing of open circuit voltage and (b) short circuit current density with the changing of light intensity up to 100 mW/cm^2 at 17 N, 3Hz.

Materials	**V_{oc}**	**I_{sc}**	**P_{max}**	**Applied force**	**d_{33}**	**Mechano sensitivity**	**Ref.**
ZnS/PDMS/PANI	35 V	77.7 nA	2.43 $\mu W/cm^3$	13.6 Kpa	…… …	……	[1]
CdS nanowall arrays	1.2 V	6 nA	6.13 nW/cm^2	……. (deforma-tion)	……..	0.143 V/N	[2]
SnS_2/PVDF	60 ± 4 V	8 ± 0.4 nA	87.11 $\mu W/cm^2$	100 N	…… ……	4.83 M/Pa	[3]
MoS_2 /TOCN	4.1 V	210 nA	…….	…….	31 PC/N	…….	[4]
WS_2/PVDF	116 V	…..	48.5 $\mu W/cm^2$	……		105 KPa	[5]
LN-$ZnSnS_3$ nanoflakes	**0.7 V**	**1 $\mu A/cm^2$**	**0.025 $\mu W/cm^2$**	**17 N**	**19 pm/V**	**20 mV/N**	**This work**

Table S1. Comparison of various parameters regarding piezoelectric energy harvesting of different sulphide-based nano/micro materials.

Materials	**Measurement parameter**	**Maxim-um Photov-oltage**	**Max. Photoc-urrent**	**Power output**	**d_{33}**	**Mechano-sensitivity**	**Ref.**
ZnO/ZnS Core/Shell Nanowires	365 nm UV radiation Power intensity 0.78 mW/cm^2 Compressive strain of -0.24%	…….	350 µA/cm^2	…….	3.8 pm/V	…….	[6]
Carbon-Fiber/ZnO-CdS Double-Shell Microwire	UV-VIS light (372-548 nm) Compressive strain of -0.38%	……..	28 µA	…….	……	…….	[7]
Cu_2S/CdS Coaxial Nanowire	Compressive strain of -0.41%	0.29V	0.3 nA	……..	…….	…….	[8]
2D MoS_2	Intensity of 4.297 mW/cm^2 by a 633 nm laser, Compressive strain of -0.38%	……..	220 nA	…….	…….	…….	[9]
LN-type $ZnSnS_3$ nanoflakes	**100 mW/cm² 17N, 3 Hz**	**0.8 V**	**1.3 µA/cm²**	**0.13 µW/cm²**	**19.3 pm/V**	**20 mV/N**	**This work**

Table S2. Comparison of various parameters of different piezophototronic sulphide-based nano/micro materials.

References

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