

Supporting Information

Boosting the Green EMI Shielding and Piezoelectric Energy Generation by Defect-Driven Microstructure Manipulations

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1. EDS spectra and elemental mapping of LKN nanoparticles

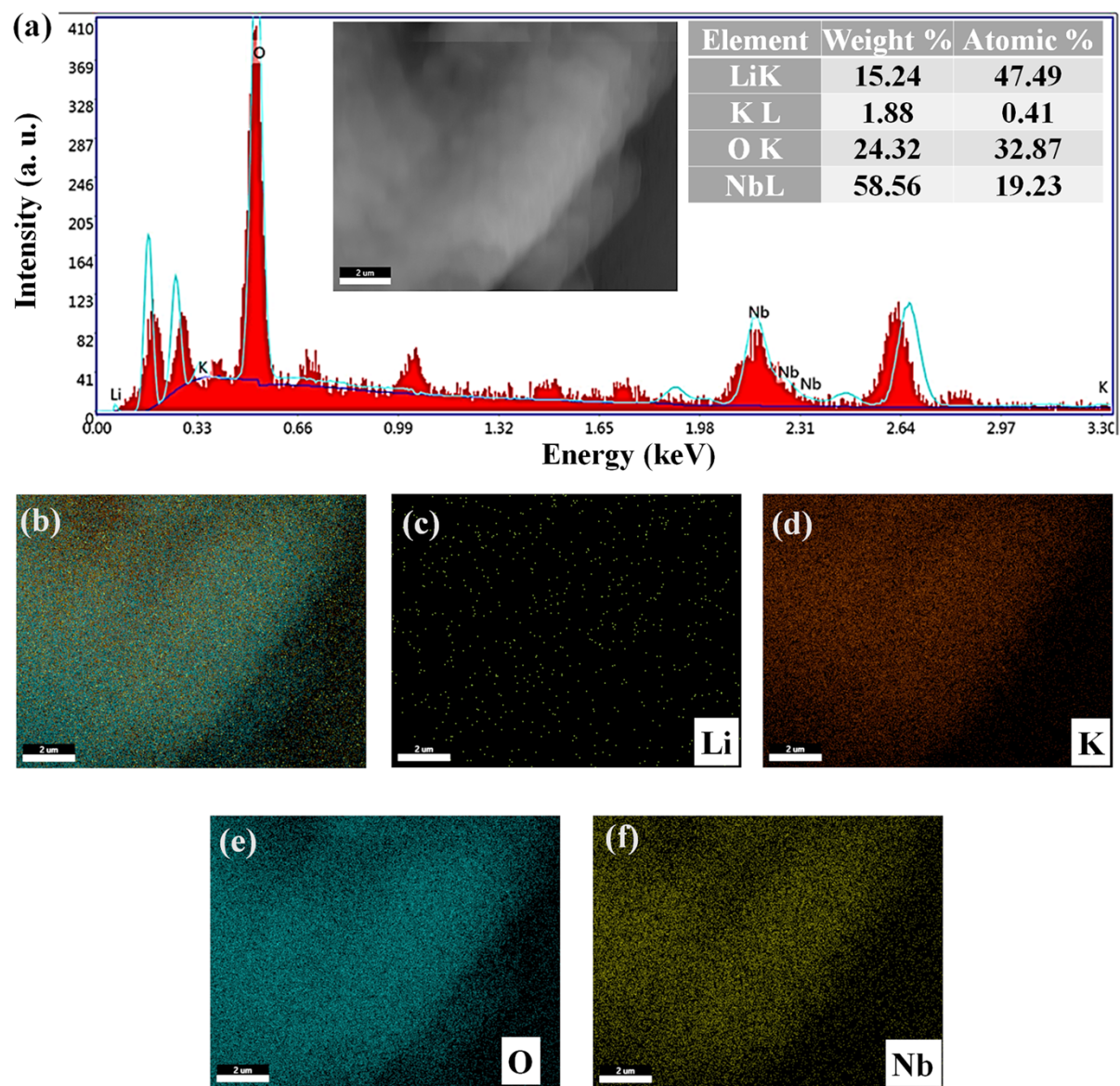


Fig. 1S. EDS spectra and elemental mapping of LKN nanoparticles.

2. EDS spectra and elemental mapping of GNLKN nanoparticles

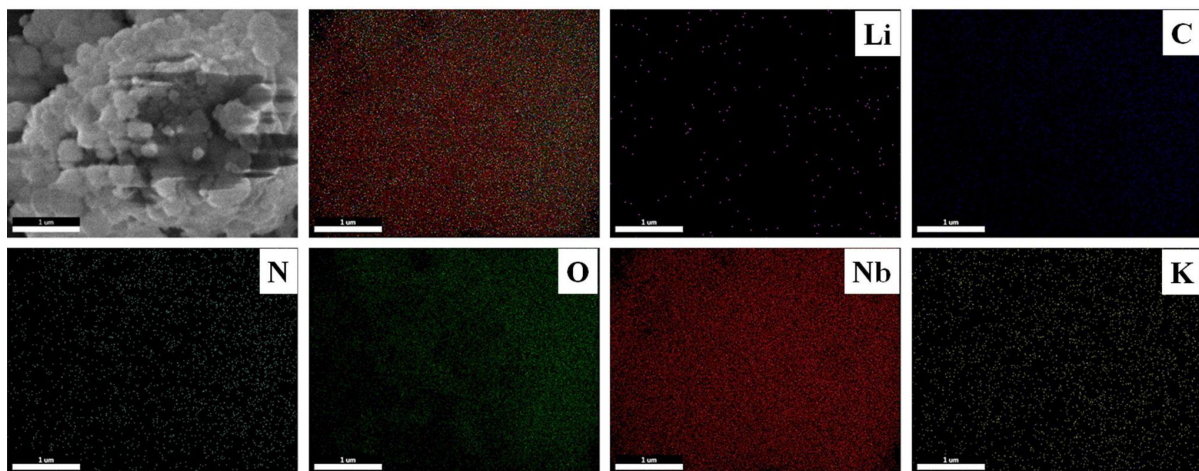


Fig. 2S. EDS elemental mapping of GNLKN nanoparticles.

3. EDS spectra and elemental mapping of composite

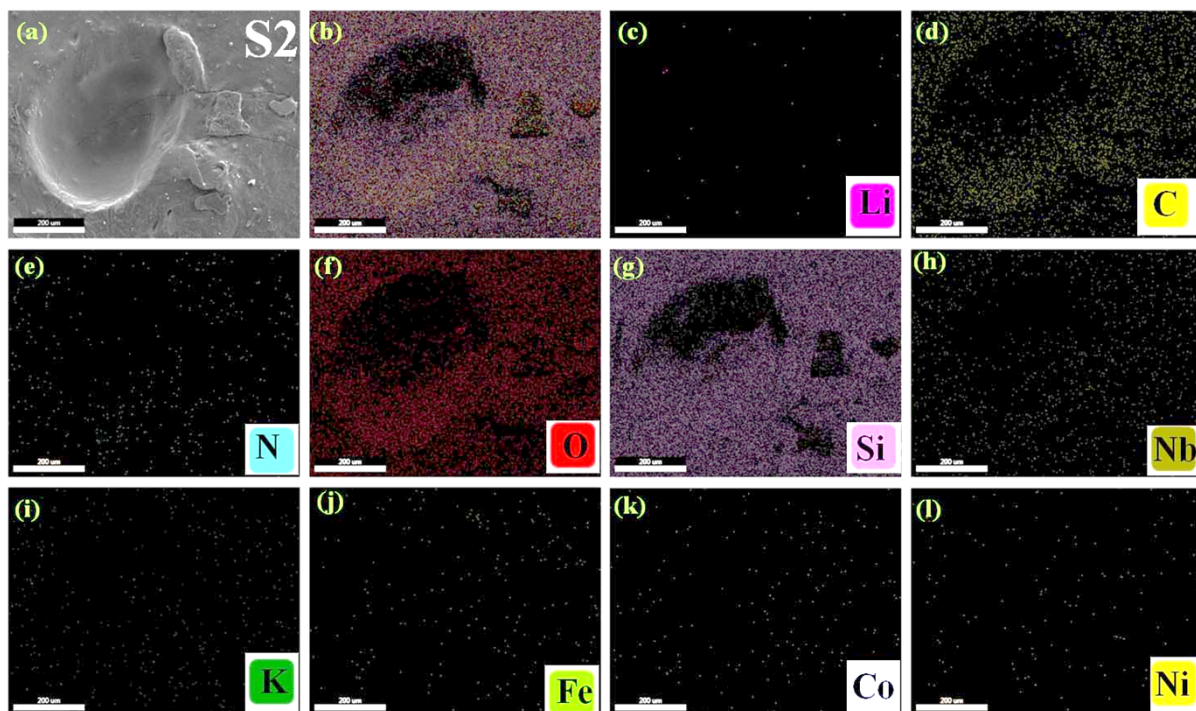


Fig. 3S. EDS elemental mapping of S2 composite.

5. EMI shielding performance of PDMS film, BC1 and BC2 composites

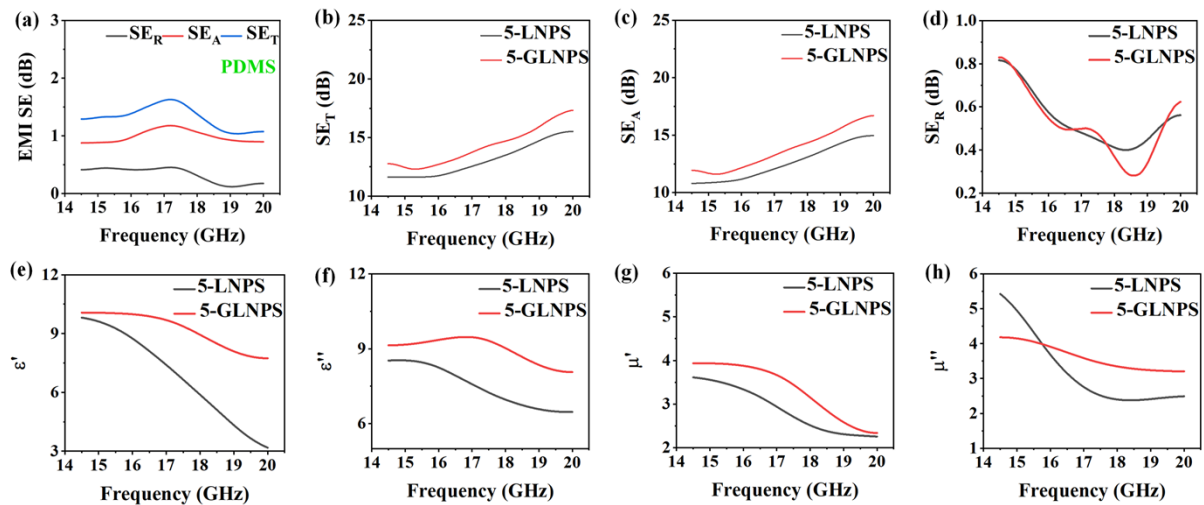


Fig. 4S. (a) SE_T , SE_A , SE_R of PDMS film, (b-c) SE_T , SE_A , SE_R of bulk composites 5-LNPS and 5-GLNPS, (e, f) real and imaginary permittivity of 5-LNPS and 5-GLNPS, (g, h) real and imaginary permeability of 5-LNPS and 5-GLNPS.

6. Finger imparting force calculation

A physical model consisting of the gravity term and pulse term was adopted to calculate the imparting pressure. When an object (finger) falls on the composite, it should comply with the main criteria: (i) first, it should touch the surface, and (ii) it should complete the action on the surface of the composite. Hence, the following equations could be introduced based on momentum and kinetic energy theorem.^{1,2}

$$m.g.h = \frac{1}{2} m.V^2 \quad (1S)$$

$$(F - m.g).\Delta t = mV \quad (2S)$$

$$\sigma = \frac{F}{A} \quad (3S)$$

Where m is the mass of the object (finger) (kg), h is the height of mass falling (in meters), σ is the applied mechanical pressure, V is the maximum falling velocity (m/s) load, F is the

contact force, and Δt is the time span. Approximate applied pressure values are calculated by inserting calibrated and measured values data.

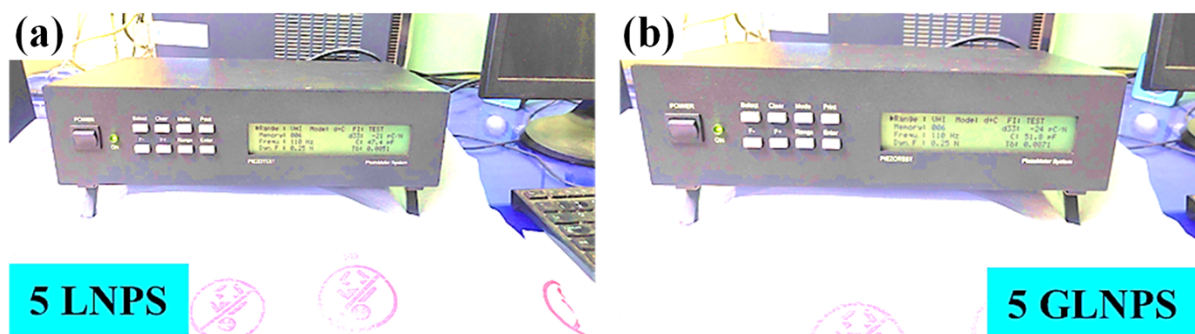


Fig. 5S. digital images captured during the d_{33} measurement instrument.

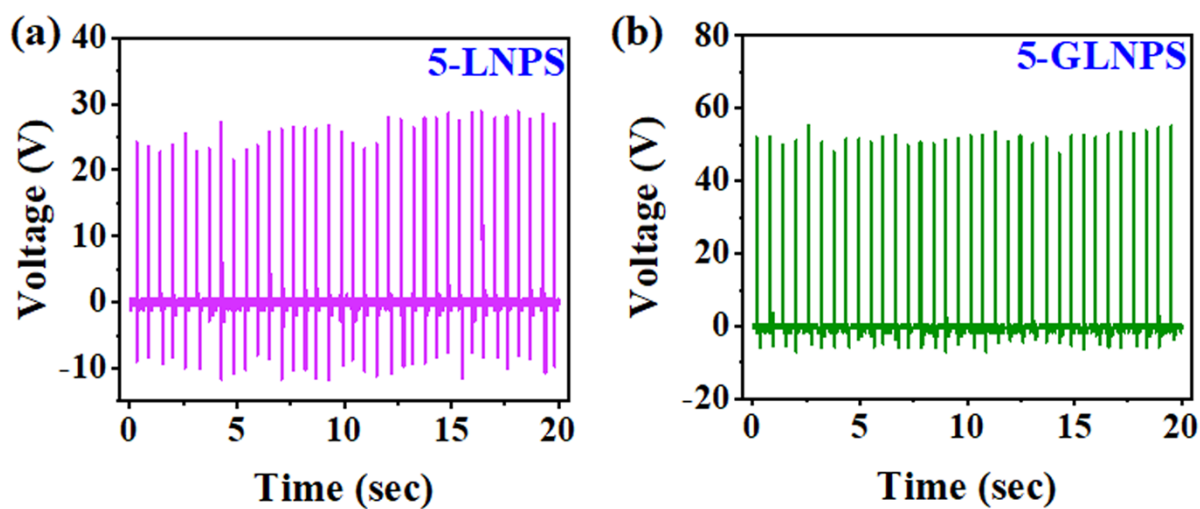


Fig. 6S. Piezoelectric output of poled 5-LNPS and 5-GLNPS devices.

References

1. P.P. Singh, B.B. Khatua, ACS Appl. Mater. Interfaces., 2024, **16**, **8**, 11050–11061.
2. P.P. Singh, A. Mondal, P. Maity, S. Ojha, G. Hati, B.B. Khatua, App. Mater. Today., 2024, **36**, 102043.