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Electronic supplementary information

High temporal resolution transparent thermoelectric temperature sensors for photothermal effect sensing

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Video 1. Calcium imaging of neuronal networks within the PEDOT:PSS region.

Table S1. Thermoelectric properties, sheet resistance and transmittance of PEDOT:PSS films with various film thicknesses.

*T_{film}: film thickness

# of printing pass	PEDOT:PSS T_{film}* (nm)	Electrical conductivity (S cm^{-1})	Seebeck coefficient (μV K^{-1})	Sheet resistance (Ω/sq)	Transmittance (%)
1	51.20 ± 1.83	619.13 ± 22.23	10.48 ± 1.29	315.66 ± 0.58	95
2	97.53 ± 3.02	615.63 ± 12.59	9.48 ± 1.27	167.84 ± 2.16	92
4	200.50 ± 4.95	642.85 ± 15.87	10.22 ± 0.21	77.61 ± 0.60	84
8	402.00 ± 1.41	644.00 ± 2.27	10.3 ± 0.55	38.62 ± 0.09	80

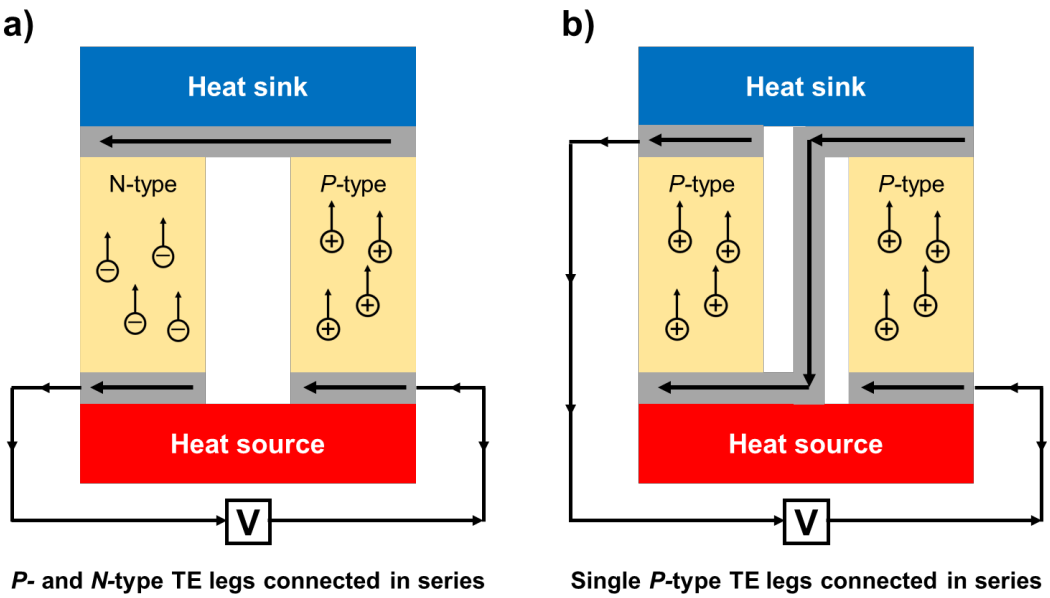

Figure S1. Principle of thermoelectric effect a) *p*- and n-type TE legs connected in series b) only p-type TE legs connected in series.

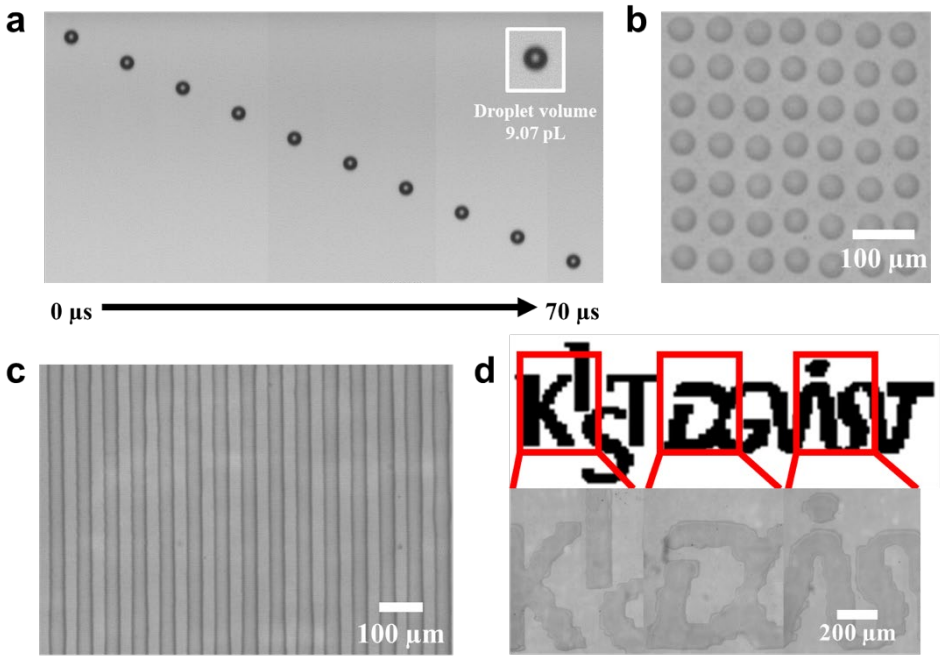

Figure S2. (a) Sequentially captured of an in-flight PEDOT:PSS ink droplet from cartridge-type nozzle (7 μs time interval). Inkjet-printed (b) dot, (c) line arrays, and (d) logos (KIST and DGIST) on glass substrates.

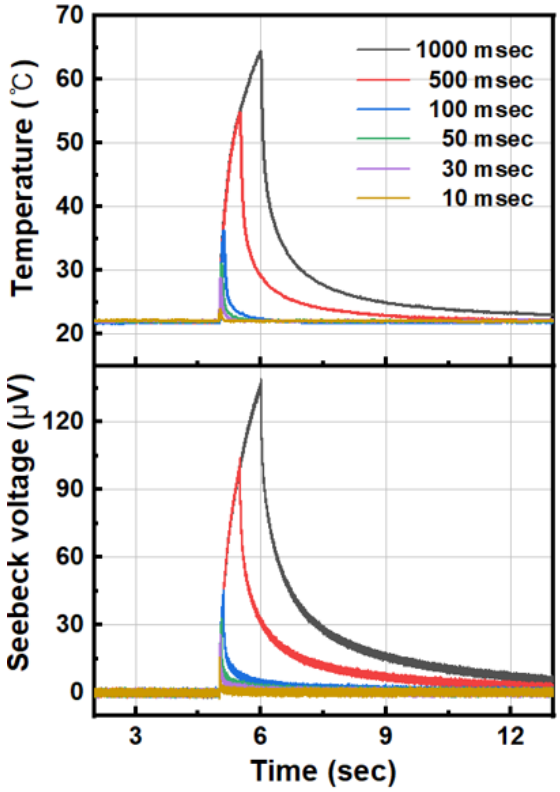

Figure S3. Temperature (top) and Seebeck voltage (bottom) changes upon the NIR laser irradiation (pulse widths: from 1 s to 10 ms) at one end of the TE layer as illustrated in Fig. 2a.

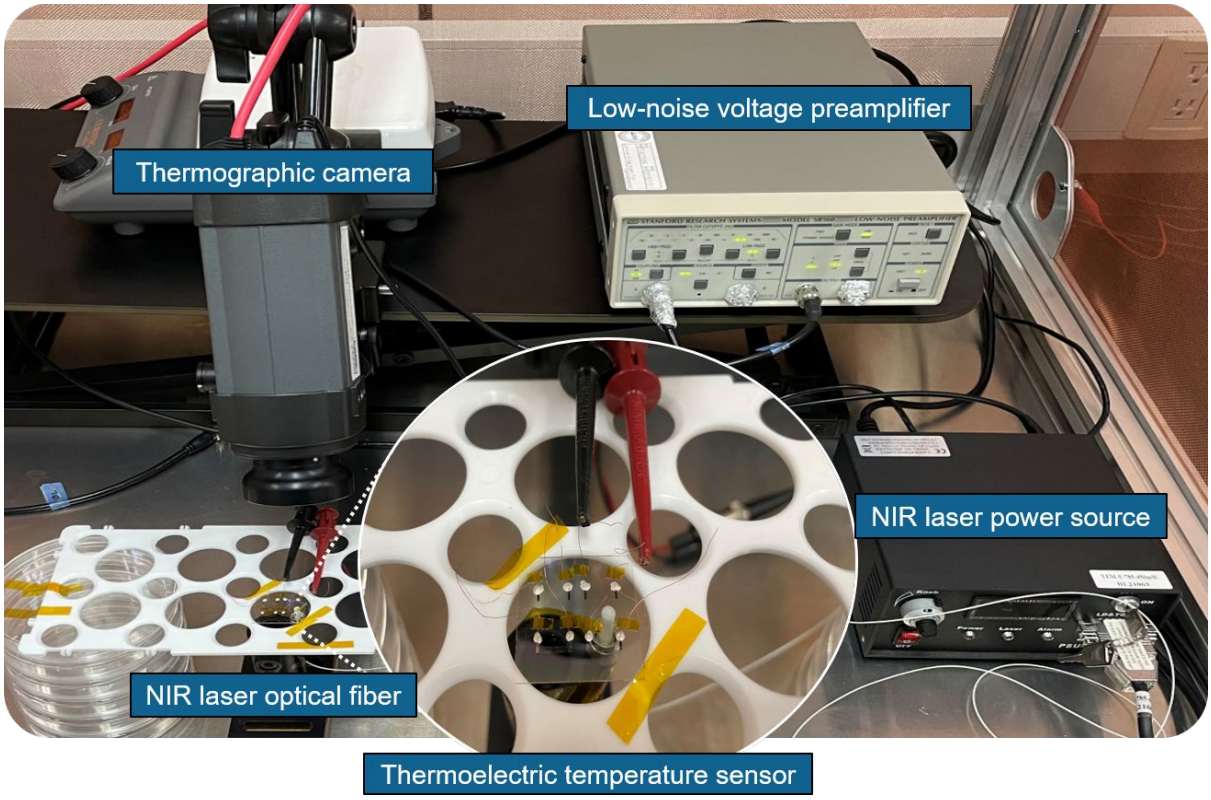

Figure S4. Experimental setup for the photothermal effect sensing using the transparent TE temperature sensors with an NIR laser irradiation from underneath.