Supplementary Information

Penetrating effect of high-intensity infrared laser pulses through body tissues

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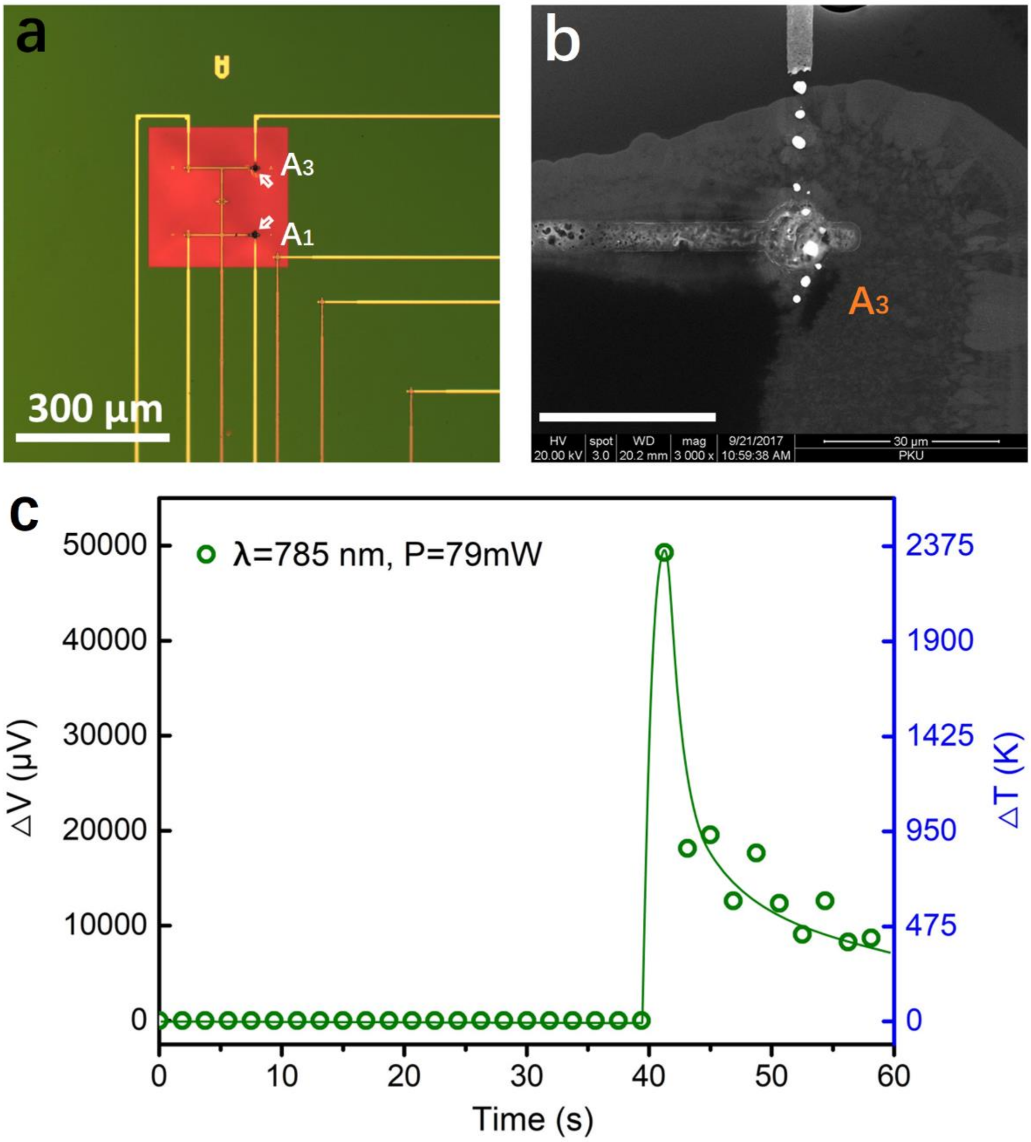
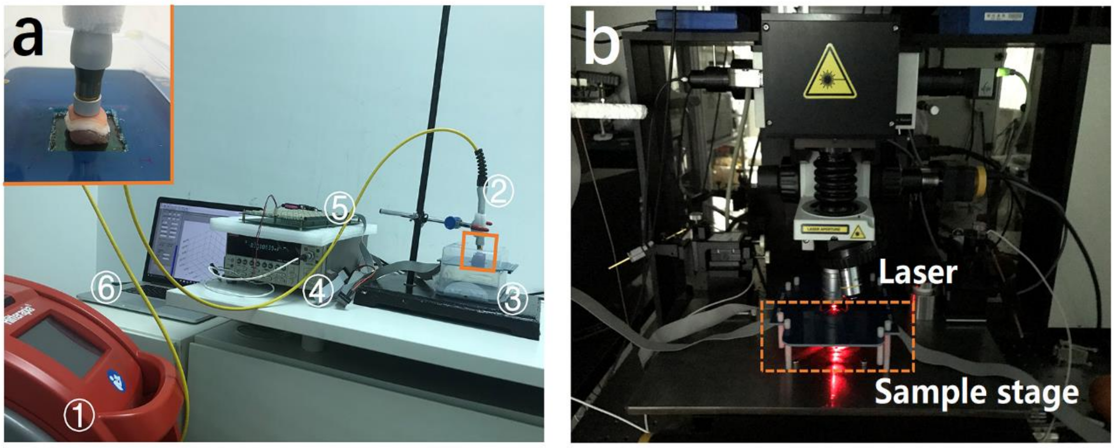
Supplementary Table S1. Attenuated laser powers at four different lasers wavelength 325nm, 488nm, 633nm, and 785nm. These values are measured laser powers after optical attenuator (namely None, D0.3, D0.6, D1, D2, D3, and D4) were inserted in the laser path, reducing the laser power from the original value to 60%, 30%, 10%, 1%, 0.1%, and 0.01%, respectively, for lasers wavelength.

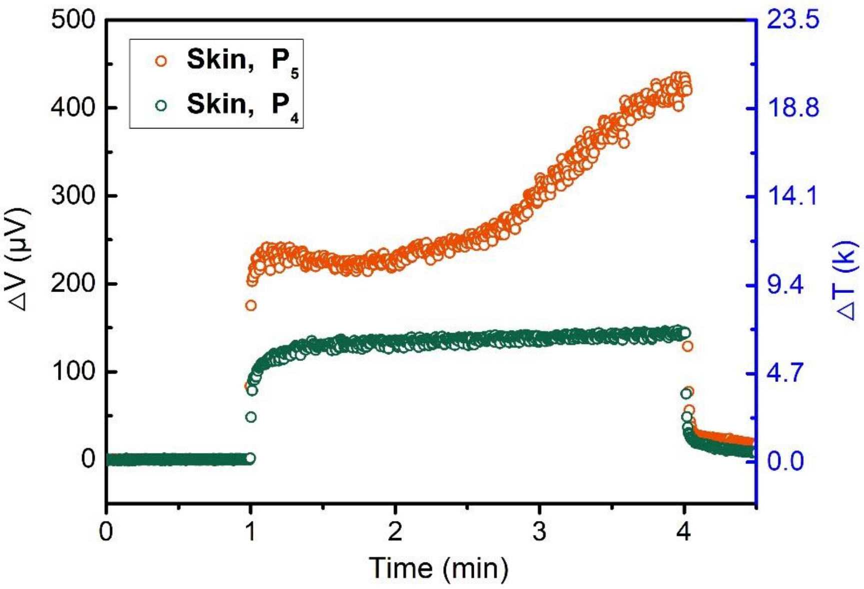
Wavelength (nm)	None (mW)	D0.3 (mW)	D0.6 (mW)	D1 (mW)	D2 (μW)	D3 (μW)	D4 (μW)
325	15.3	10.4	6.6	2.6	308.1	47.0	26.4
488	15.1	7.5	4.3	1.9	113.9	12.7	2.0
633	34.9	18.0	9.5	2.9	233.5	32.6	3.4
785	79.2	43.5	22.5	9.6	868.7	87.7	11.9



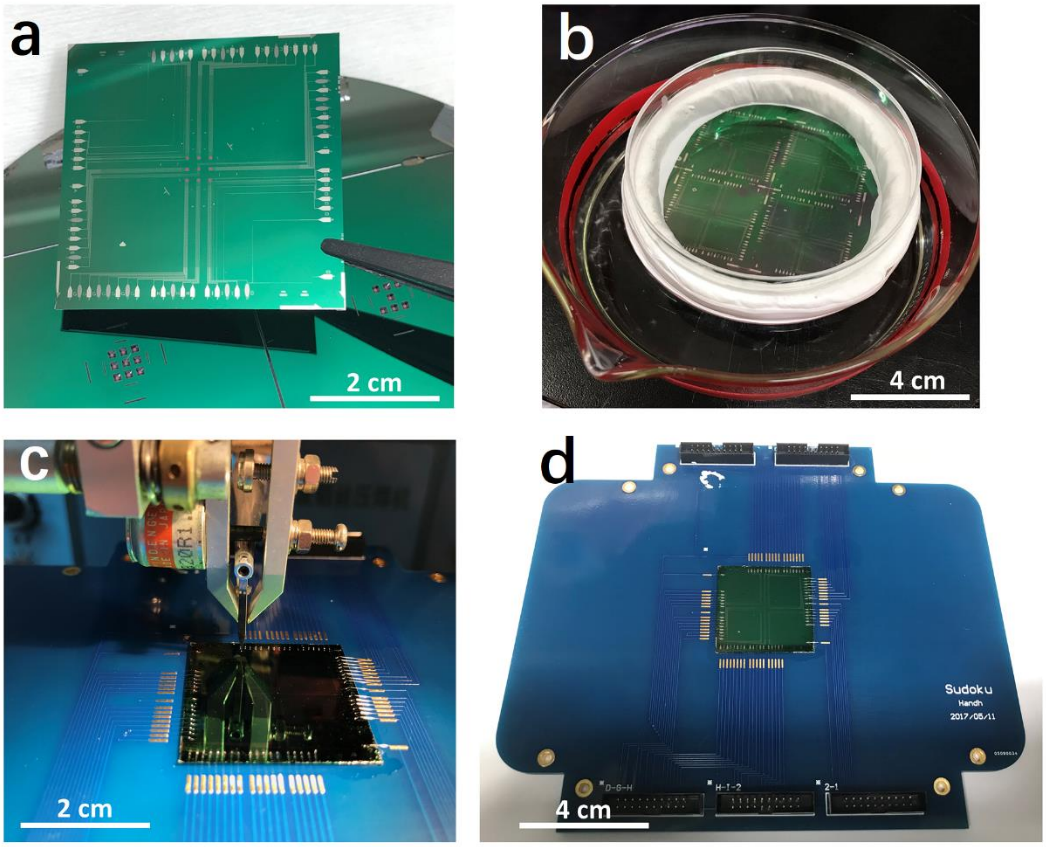
Supplementary Fig. S1: A failed device after tested with a 785 nm laser at the power of 79.2 mW. (**a**) Photograph of the device after measurement, showing that sensors A1 and A3 were burned out (turned black, marked with white arrows). (**b**) SEM microscopy of the burnt junction region of A3, showing molten and broken dots of Cr and Pd beams. (**c**) Real time measurement results of the device before and after the irradiation of 79 mW 785nm laser. A peak output of 49,300 μV was recorded, corresponding to a peak temperature of 2350 K



Supplementary Fig. S2: Photographs of the measurement systems used in this work, one for practical clinic laser treatment, and the other for cleanroom applications. (**a**) Photograph of the medical laser system used in clinic treatment, where ① is 1064 nm Nd:YAG pulsed laser system, ② is the laser cable, ③ is the sample stage and measurement sample, ④ is the Keithley 2182A nanovoltmeter, ⑤ is the 10×10 multiplexer and, and ⑥ is the computerized data acquisition system. An enlargement of the orange frame in the inset for details. (**b**) Photograph of the measurement system used in our cleanroom. Lasers of different wavelengths exit the microscope after passing through inner optical path. The orange dotted frame is the sample stage with the device.



Supplementary Fig. S3: Outputs of TFTCs for the same part of a porcine skin tissue sample under laser irradiation of two different powers. The orange and green circles represent the photon fluxes that penetrate a 1.5 mm thick skin sample at laser powers of P_5 7.1 W and P_4 4.3W, respectively, both operated at 20 Hz. The corresponding local temperatures at the laser spots are shown with coordinates on the right.



Supplementary Fig. S4: Photographs of fabrication processes for the device with TFTC array on Si_3N_4 windows used in this work. (**a**) A typical Pd/Cr micro-TFTC array was prepared on the Si_3N_4/Si [100]/Si_3N_4 substrate. (**b**) The device etched the freestanding Si_3N_4 thin-film windows in 30 vol. % KOH at 80-85 °C in a water bath with a floating technique. (**c**) The micro-TFTC array sample was bonded to the Printed Circuit Board through the wire bonding process. (**d**) The device consists of micro-TFTC array and Printed Circuit Board.

Supplementary Video S1: A video showing irradiation of 1064 nm laser pulses (from a Nd:YAG pulsed laser) on a 10 mm thick porcine skin-fat-muscle sample during a 120 s test process. In this video, one sees that with the accumulating time for laser irradiation, the tissue gradually changed its color. At the end of the test, the sample surface was remarkably degenerated and burn spots occurred.