Supplementary Information for

Non-genetic photoacoustic stimulation of single neurons by a tapered fiber optoacoustic emitter

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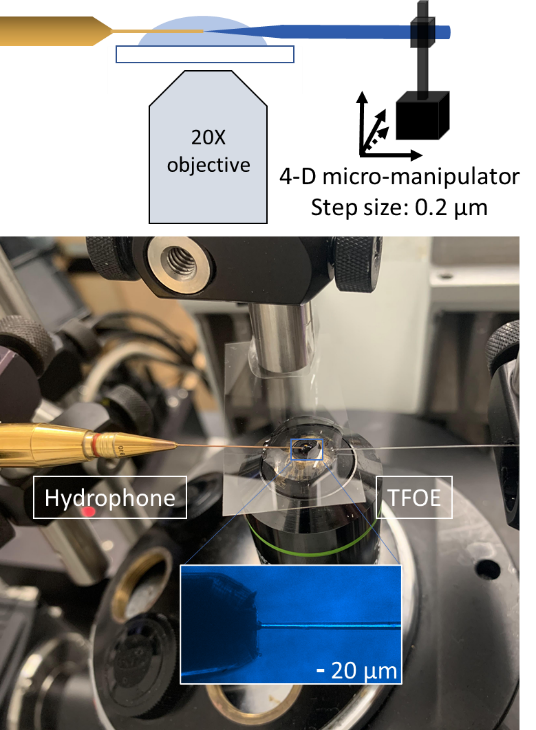
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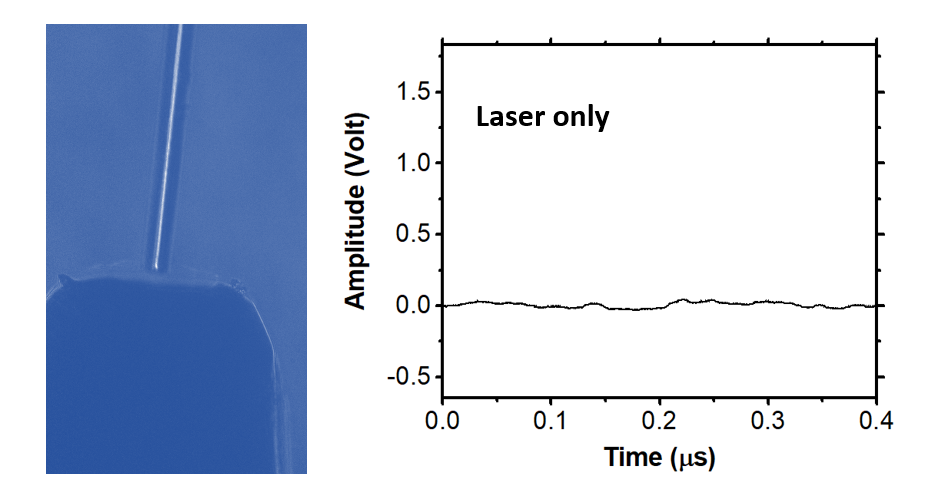
*6 Neurophotonics Center, Photonics Center, Boston University, 8 St. Mary’s Street, Boston MA 02215, USA*

***#*** *equal contributions.*

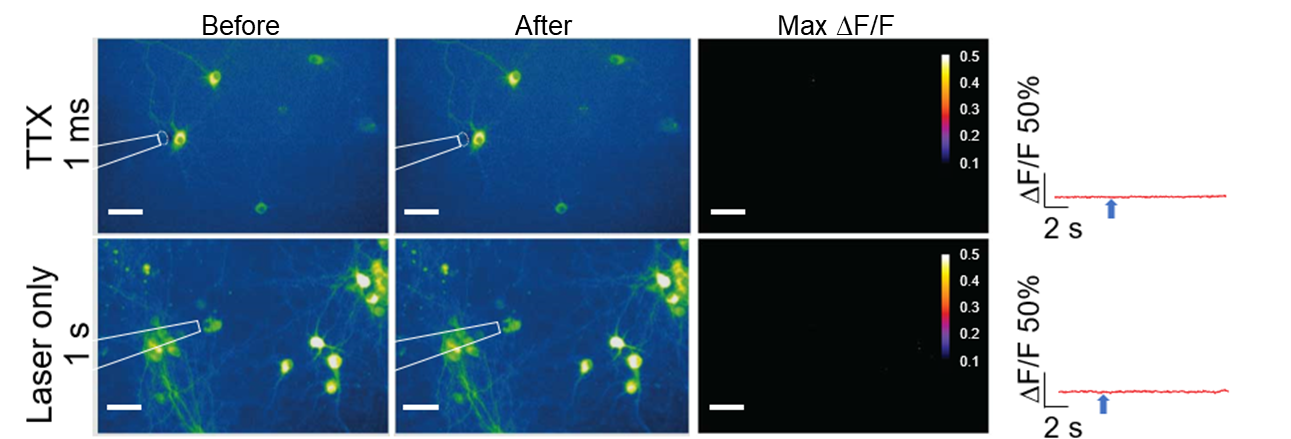
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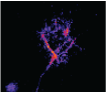
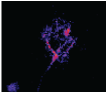
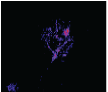
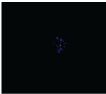
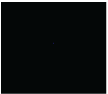
**Fig. S1. Experimental set up for optoacoustic characterization.** Inset: optical image of the hydrophone and TFOE.



**Fig. S2. Influence of laser on the hydrophone using a bare tapered fiber.** Laser pulse energy: 6.7 µJ.



**Fig. S3. Fluorescence images and calcium traces of single neurons in sparse population stimulated by TFOE (1 millisecond) with TTX and laser only (1 s).** Laser repetition rate: 1.7 kHz; average power: 11.4 mW. Scale bars: 50 µm. Blue arrows: laser onset.



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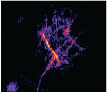
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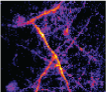
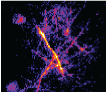


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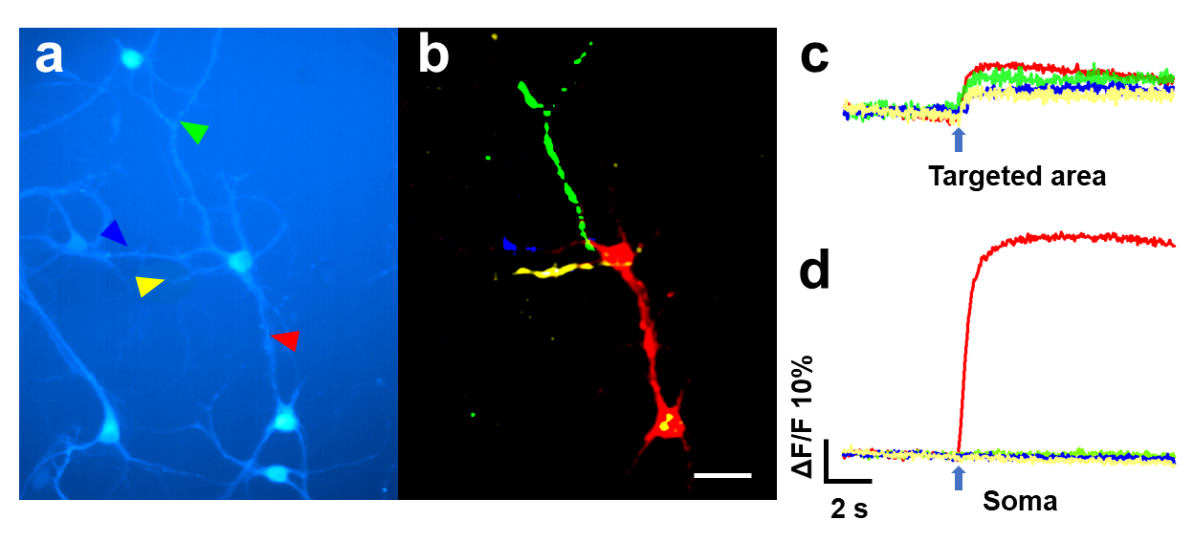
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**Fig. S4. TFOE evoked axon stimulation with calcium wave propagating along neuron network.** Fluorescence contrast images (ΔF/F) were taken at varied time points. White circles: the position of TFOE tip. Laser duration: 1 ms; repetition rate: 1.7 kHz; average power: 11.4 mW. Scale bars: 50 µm.

 **Fig. S5. Subcellular spatial precision of TFOE targeting axon and dendrites. (a)** Another multipolar neuron with TFOE targeting axon (red) and dendrites (green, blue and yellow). (**b)** Maximum ΔF of calcium signal upon stimulation of different areas. **(c)** Calcium traces of targeted areas upon stimulation. **(d)** Calcium traces of the soma of targeted neuron upon stimulation of different neurites. Scale bar: 50 µm.