All-optical regulation of gene expression in targeted cells

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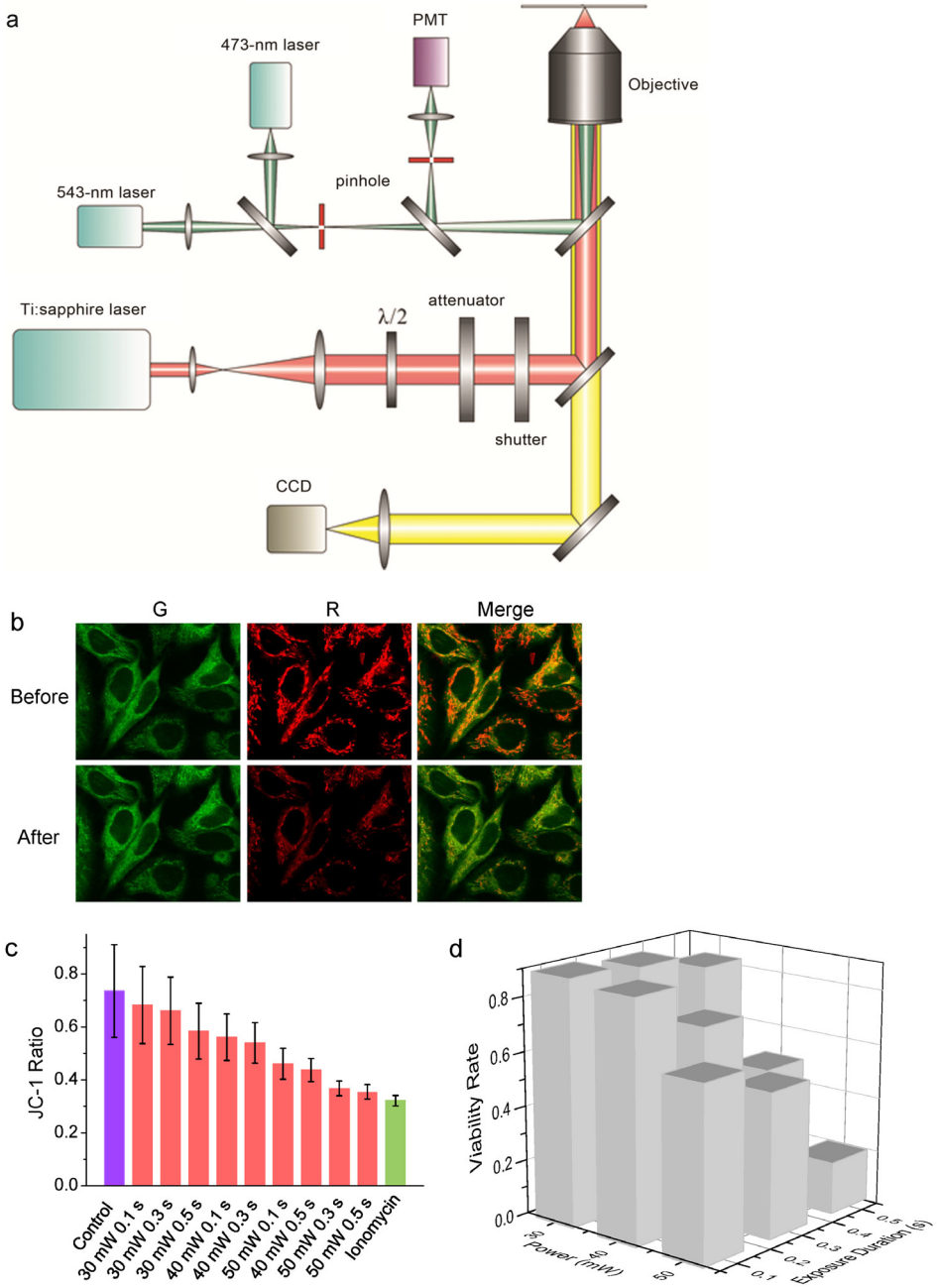
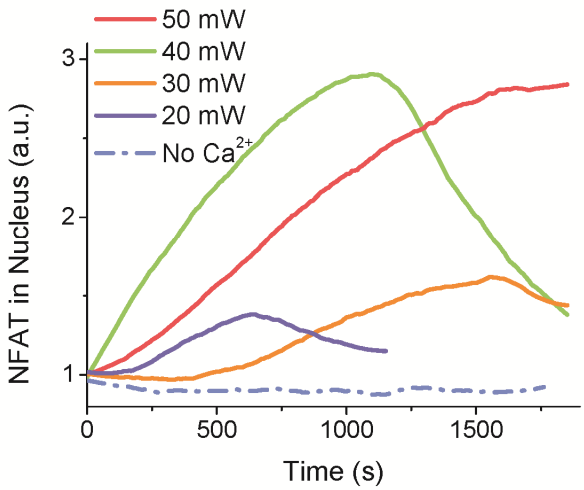
Supplementary Figures

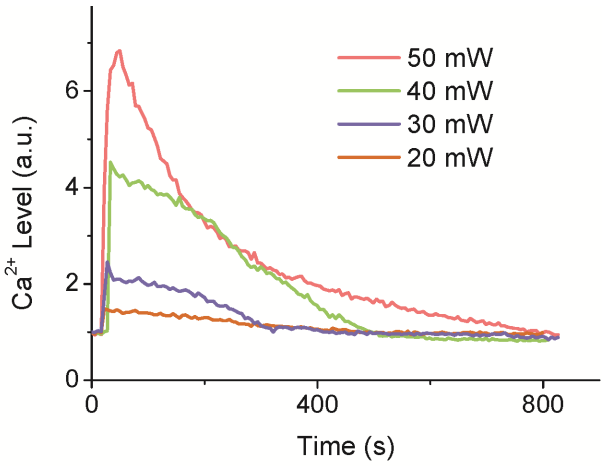


Supplementary Figure S1. a. Experimental setup. The Ti:Sapphire laser is coupled into a confocal microscope (Olympus FV1000/IX81). The objective is water-immersed with near infrared coating and N.A.=1.2.The diameter of laser focus is around 1 μm. b. Fluorescence of JC-1 of cells before and after laser treatment. The Red/Green fluorescence ratio of JC-1 changes a lot after laser irradiation at 50 mW for 0.1 s. The mitochondrial potential significantly decreased indicating the cells became unhealthy. c. Health condition of cells with different laser treatments indicated by JC-1 (n=50 independent cells in each group). Control: cells without any treatment. Ionomycin: cells treated with ionomycin

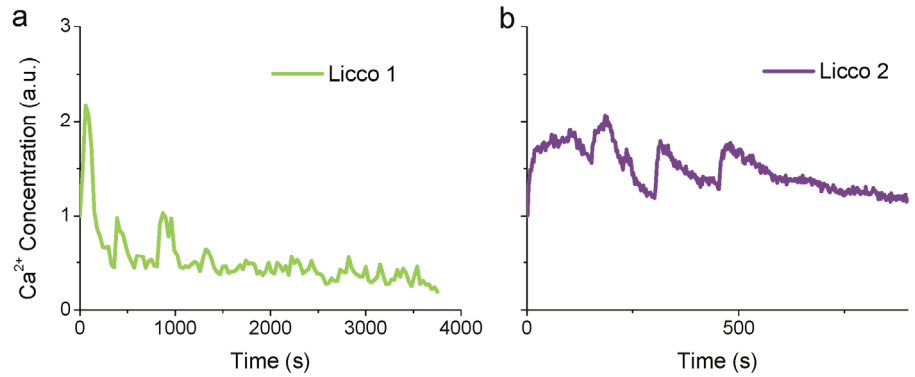
at 10 μM. d. Cell viability rate at different laser-treatment conditions tested three hours later by typan blue (n=20 cells in each experiment).



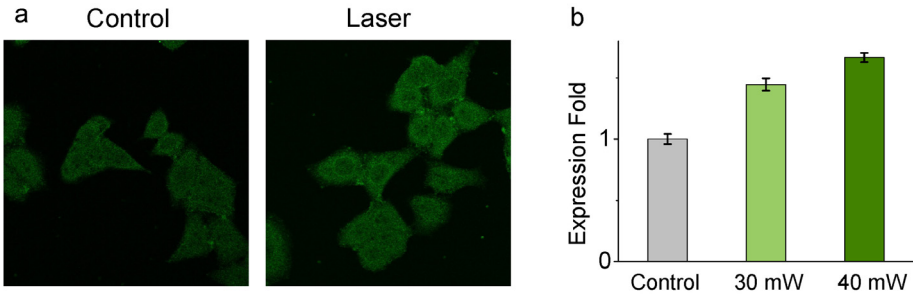
Supplementary Figure S2. Variable translocations of NFAT induced by laser treatment for 0.3 s under different power levels. The most efficient translocation of NFAT can be found when the laser power was larger than 40 mW. If the cellular Ca^{2+} was chelated by BAPTA (1,2-bis(o-aminophenoxy) ethane-N,N,N',N'-tetraacetic acid) and incubated in Ca2+-free medium, there is no NFAT translocation after laser treatment.



Supplementary Figure S3. Ca^{2+} release in MSCs after exposure of femtosecond laser at different powers (n=5 cells in each experiment). The time of taking up Ca^{2+} in MSC is shorter than in HeLa cells.



Supplementary Figure S4. Different types of Licco in MSCs. Licco can be controlled by parameters of laser exposure including laser power, exposure duration and interval between two exposure events. The parameters for laser treatments are 50 mW, 0.1 s, and 540 s (a), and 40 mW, 0.2 s, and 150 s (b). The fluorescence in (a) is declining because of long-time scanning caused bleaching of Fluo-4.



Supplementary Figure S5. Immunofluorescence of TNF-α by another group of antibody. The measured upregulation level of gene expression was quite similar to the results in Fig. 2b.