Supporting information

Localized micro-scale disruption of cells using laser-generated focused ultrasound

Hyoung Won Baac[1], John Frampton[2], Jong G. Ok[3], Shuichi Takayama[2], and L. Jay Guo[1]
[1]*Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI 48109, USA*
[2]*Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI 48109, USA*
[3]*Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI 48109, USA*

Figure S1 shows the LGFU setup combined with an inverted microscope. The pulsed laser beam (6-ns pulse width, 532-nm wavelength; Surelite I-20, Continuum, Santa Clara, CA) initially has 5 mm in diameter. The beam was expanded (×5) and then irradiated on the transparent (planar) side of the optoacoustic lens. The optoacoustic lens was mounted on 3-dimensional motion stages. The cell culture substrate placed on the microscope stage was first aligned with an optical focus. Then, the ultrasonic focal plane was aligned with the culture substrate. We note that a fixed-length spacer was made of UV-curable epoxy before the optoacoustic lens used in the microscope setup. The bottom surface of the spacer guides the ultrasonic focal plane (confirmed using a fiber-optic hydrophone). Halogen and mercury lamps were used to illuminate the sample for bright-field and fluorescence imaging, respectively. Since the CNT-coated optoacoustic lens blocked light illumination above the sample (an optical extinction of the CNT-composite layer was higher than 85%), the incidence direction of the halogen lamp was slanted.

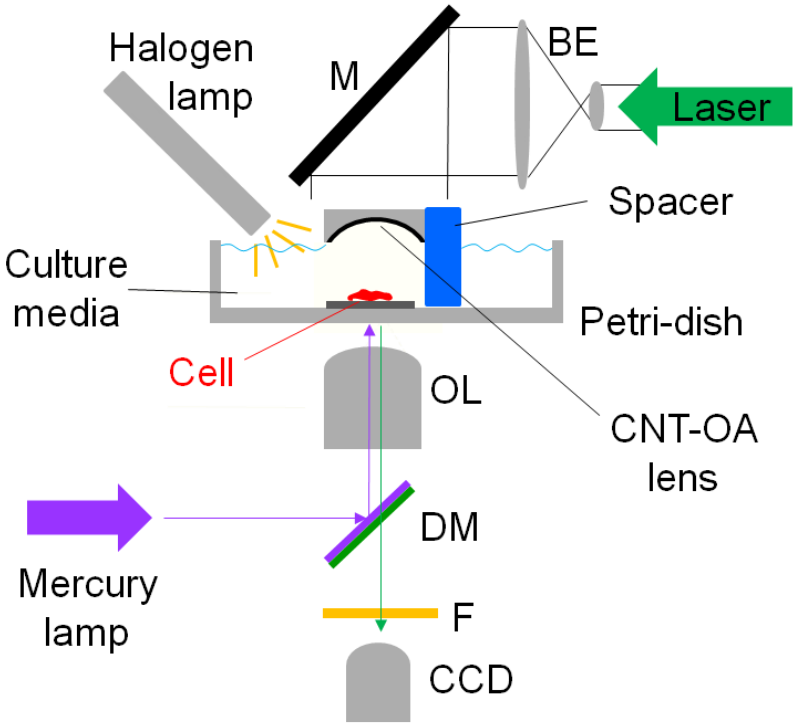

Fig. S1 Experimental setup for cell detachment and biomolecule delivery (BE: beam expander, CNT-OA lens: CNT-coated optoacoustic lens, DM: dichroic mirror, F: optical notch-filter to block the scattered laser beam, M: mirror, OL: objective lens).