Supplementary Information

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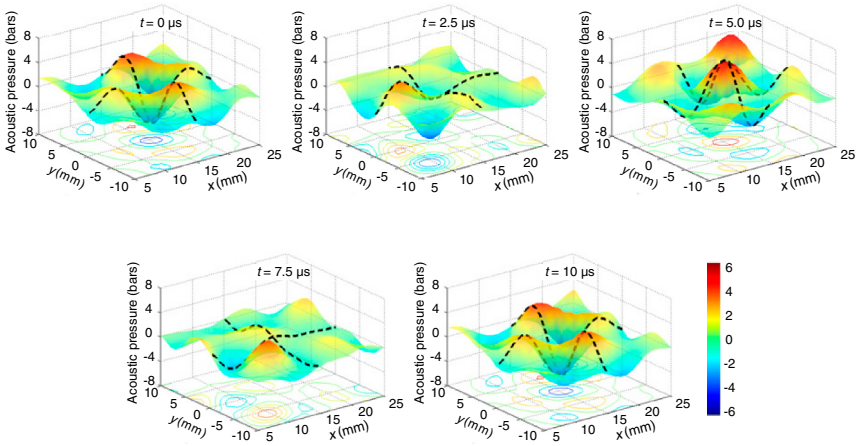

Fig. S1. Spatial distribution of the acoustic pressure. The measurement region is the area where the microchannel is attached on the microscope slide. The dashed lines denote the center of that region and aids the visualization of the standing wave pattern.

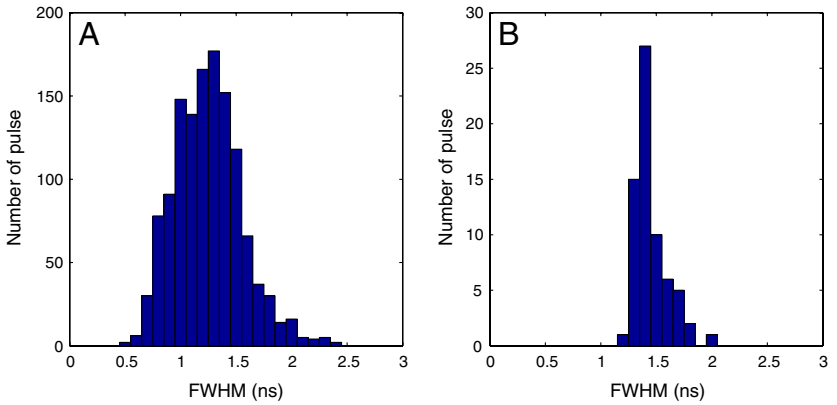

Fig. S2. Distribution of photomultiplier pulse widths: Histogram of the pulse width distribution (FWMH) recorded with the photomultiplier for (*a*) luminol chemiluminescence and (*b*) sonoluminescence. The resolution is limited by the response time of the acquisition system: The data acquisition system consists of a photomultiplier (H5783, Hamamatsu) and a high-capacity sampling oscilloscope with an analog bandwidth of 600 MHz (WaveRunner 64Xi-A, LeCroy) connected through a 50-Ω coaxial cable. The rise time of the photomultiplier and the oscilloscope are 0.78 ns and 0.50 ns, respectively. The response time of a system can be estimated by the convolution of the responses of individual components (1), in this case is given by $\tau_{sys} = \sqrt{\tau_{pmt}^2 + \tau_{osc}^2 + \tau_{cab}^2}$, where τ_{pmt}, τ_{osc}, and τ_{cab} are the rise time of the photomultiplier, oscilloscope, and cable, respectively. The 50-Ω coaxial cable has a very high bandwidth (typically ≥4 GHz); thus its rise time is negligible. The calculated response time of the system is therefore $\tau_{sys} = 0.93$ ns. The corresponding pulse width, measured as the FWHM is approximately $1.4\tau_{sys} = 1.30$ ns. This value limits the resolution of the measured FWHM. Therefore, the actual width of the chemiluminescence and sonoluminescence may be less than this value.

1. Matula TJ, Roy RA, and Mourad PD (1997) Optical pulse width measurements of sonoluminescence in cavitation-bubble fields. *J Acoust Soc Am* 101:1994–2002.

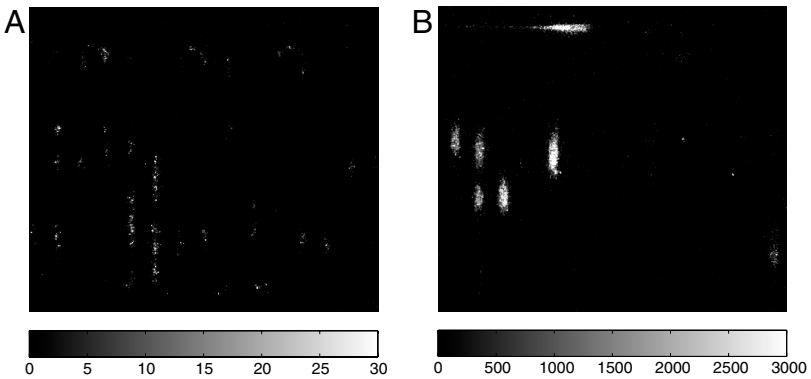

Fig. S3. Light emitted from (*a*) sonoluminescence and (*b*) sonochemical reaction (chemiluminescence from Luminol). The field of view is 21 mm × 18 mm. Both pictures were captured with an intensified CCD camera (iStar 734, Andor) under the same ultrasound exposure condition: an excitation voltage of 230 V at the resonance frequency of the system of 103.6 kHz for 50,000 cycles (0.48 s). The gray-scale bars below the picture relate the measured intensity (pixel value) with the printed gray scale. We have subtracted from both images a background level of 700. Note that the sonoluminescence picture is scaled between 0 and 30, whereas the Luminol emission is scaled between 0 and 3,000. Thus the light emitted from sonoluminescence is about 2 orders of magnitude weaker.