Electronic Supplementary Information

Collective Behavior of Bulk Nanobubbles Produced by the Alternating Polarity Electrolysis

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Supplementary figures

Figure S1. Principal scheme of the class AB power amplifier used to drive the electrochemical process. A waveform is formed by an external generator and then amplified 10 times. The amplifier uses a combined feedback. At frequencies below 5 MHz voltage feedback is applied; due to this feedback the amplified signal is repeated with high precision and the amplifier has low output impedance. Above 5MHz current feedback is applied providing a high increase rate of the output signal (5×10^8 V/s has been reached). The output impedance is kept below 1 Ω using the Darlington circuit in the output stage.



▼ -12V

Figure S2. Schlieren contrast of nanobubbles collected near free liquid surface (indicated by the red arrows). The bubbles are produced by the pulses at frequency f = 200 kHz with the voltage amplitude modulated by the triangle waveform. One cycle is 5 s long; the maximum amplitude is U = 11 V. (a) Before the electrochemical process is started. (b) After one cycle. (c) After two cycles.



Figure S3. Buoyancy effect when the substrate is fixed vertically (along the direction of gravity). The nanobubbles are produced at the same conditions as in Figure S1. Position of the cloud of nanobubbles is indicated by the red arrows. The images (a), (b), and (c) correspond to the moment of time t = 0 s, t = 1.25 s, and t = 2.5 s, respectively.

