Table 1. The effective temperature ($T_{eff,}$ K), electron density (N_e, cm^{-3}), pressure ($P_{SBSL,}$ atm) and other parameters of SBSL plasma calculated from the asymmetric deviation of 763 nm SBSL Ar line fitted to a symmetric Lorentzian function at different perturbation distances at driving P_{ac} = 2.4 bar.

D (mm)	Δ_{amp} (%)	A (FWHM)	α	N_e (cm^{-3})	T_{eff} (K)	N_{Ar}	ρ (cm^{-3})	P_{SBSL} (atm)
Z-2	-1.92	0.095	2.76E-05	3.45E+18	8,570	8.00E+16	2.14E+21	2.45E+03
Z-1.5	-1.91	0.094	2.70E-05	2.43E+18	8,528	7.93E+16	2.13E+21	2.42E+03
Z-1	-1.64	0.081	1.42E-05	2.40E+17	8,194	7.61E+16	1.96E+21	2.06E+03
Z-0.9	-1.55	0.076	1.12E-05	4.16E+16	8,103	7.04E+16	1.78E+21	1.87E+03
Z-0.8	-1.48	0.072	9.18E-06	1.72E+15	7,867	6.54E+16	1.60E+21	1.62E+03
Z-0.7	-1.37	0.066	6.64E-06	1.83E+14	7,779	5.99E+16	1.45E+21	1.44E+03
Z-0.6	-1.32	0.064	5.68E-06	5.15E+13	7,630	5.51E+16	1.31E+21	1.36E+03
Z-0.5	-1.21	0.058	3.94E-06	1.88E+13	7,577	4.96E+16	1.17E+21	1.21E+03
X-2	-1.97	0.098	3.08E-05	3.57E+18	8,917	8.04E+16	2.23E+21	2.75E+03
X-1.5	-1.95	0.097	2.95E-05	3.54E+18	8,875	8.00E+16	2.21E+21	2.69E+03
X-1	-1.87	0.093	2.47E-05	7.19E+17	8,603	7.65E+16	2.08E+21	2.31E+03
X-0.9	-1.77	0.087	1.95E-05	2.24E+17	8,472	7.29E+16	1.94E+21	2.16E+03
X-0.8	-1.71	0.084	1.69E-05	5.20E+16	8,261	6.98E+16	1.80E+21	2.02E+03
X-0.7	-1.65	0.081	1.45E-05	1.22E+16	8,155	6.67E+16	1.70E+21	1.86E+03
X-0.6	-1.54	0.076	1.09E-05	2.92E+15	8,027	6.45E+16	1.61E+21	1.79E+03
X-0.5	-1.46	0.071	8.67E-06	1.05E+15	7,903	6.12E+16	1.51E+21	1.64E+03

Z-# and X-# (mm) – distance of Z- or X-perturbation by a glass rod; **Δ_{amp} (%)** – the amplitude of minimum deviation of individual SBSL Ar atom emission line averaged from a Lorentzian least-square-fit; **A (FWHM)** – ion broadening parameter; **α** – degree of ionization; **N_{Ar}** – average number of argon atoms and **ρ (cm^{-3})** – effective local density in emitting area.

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Table 2. The effective temperature (T_{eff}, K), electron density (N_e, cm^{-3}), SBSL pressure (P_{SBSL}, atm) and other parameters of SBSL plasma calculated from the asymmetric deviation of 763 nm SBSL Ar line fitted to a symmetric Lorentzian function at driving acoustic pressure from 1.2 to 2.4 bar.

P_{ac} (bar)	Δ_{amp} (%)	A (FWHM)	α	N_e (cm^{-3})	T_{eff} (K)	N_{Ar}	ρ (cm^{-3})	P_{SBSL} (atm)
1.2	-1.3	0.063	5.32E-06	1.88E+15	7,572	5.39E+16	1.27E+21	1.31E+03
1.4	-1.39	0.067	7.05E-06	7.55E+15	7,751	5.62E+16	1.36E+21	1.44E+03
1.7	-1.48	0.072	9.18E-06	3.07E+16	7,997	6.14E+16	1.53E+21	1.67E+03
2.0	-1.62	0.079	1.34E-05	1.41E+17	8,195	7.07E+16	1.81E+21	2.02E+03
2.2	-1.76	0.086	1.90E-05	4.04E+17	8,436	7.64E+16	2.01E+21	2.31E+03
2.4	-1.91	0.094	2.69E-05	2.48E+18	8,569	8.14E+16	2.17E+21	2.53E+03

P_{ac} (bar) –driving acoustic pressure; **Δ_{amp} (%)** – the amplitude of minimum deviation of individual SBSL Ar atom emission line averaged from a Lorentzian least-square-fit; **A (FWHM)** – ion broadening parameter; **α** – degree of ionization; **N_{Ar}** – average number of argon atoms and **ρ (cm^{-3})** – effective local density in emitting area, **P_{SBSL}** – pressure of SBSL.

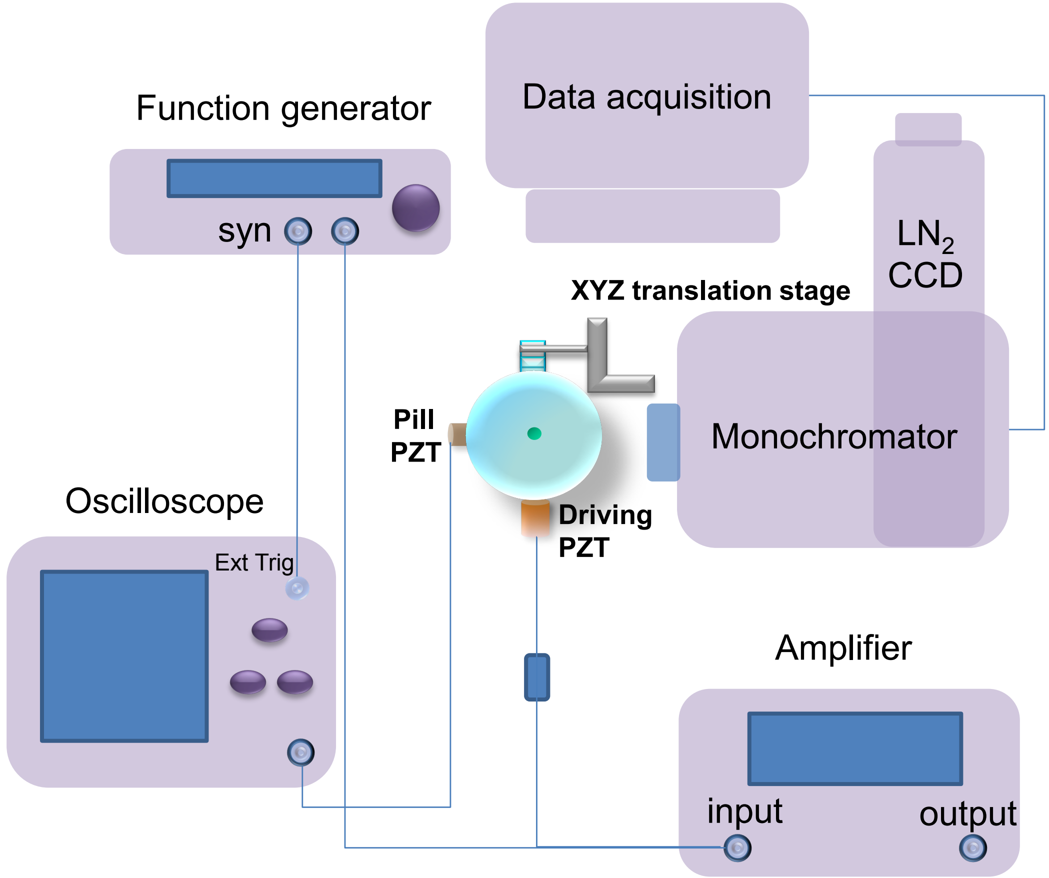

Figure SI 1. Sketch of the SBSL experimental set-up showing the quartz spherical resonator mounted to a XYZ translation stage. The PZT element glued to the bottom of the SBSL cell is linked to the function generator and amplifier through BNC connectors. A small PZT pill microphone is connected to the oscilloscope synchronized with the function generator. The SBSL was collected by a monochromator with a CCD camera cooled by liquid nitrogen. The spectra acquisition and analysis were performed in Syner JY software data processing.

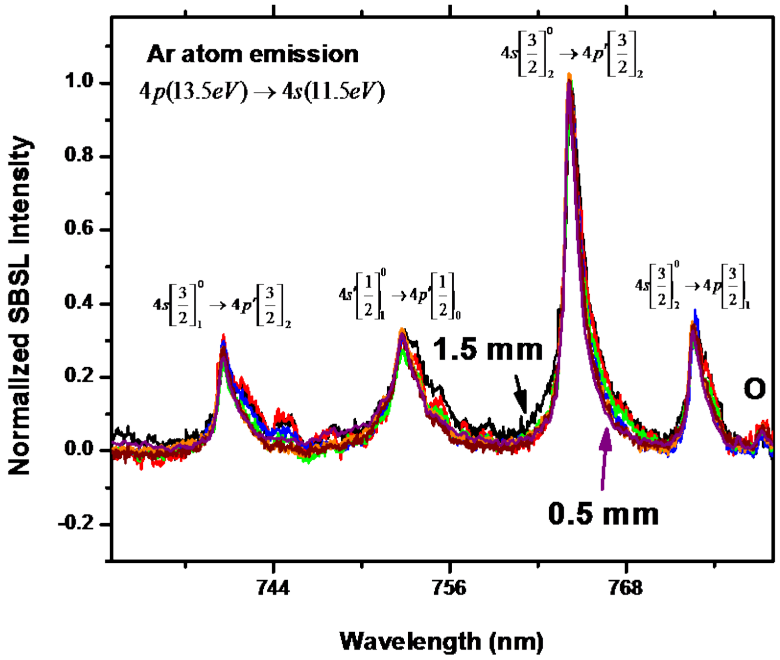

Figure SI 2. SBSL spectra during X-perturbation from 1.5 mm (black line and arrow) to 0.5 mm (violet line and arrow) by a glass rod in 85 wt% H_2SO_4 (5 % Ar) at applied acoustic pressure 2.4 bar (measured with a needle hydrophone at approximate bubble location). The SBSL spectra show Ar atom emission lines at 738 nm, 750 nm, 763 nm and 772 nm from the 4p (13.5 eV) to 4s (11.5 eV) manifold. A small peak at 777 nm is assigned to the oxygen atom emission due to the transitions between the 3p (10.7 eV) and 3s (9.15 eV) manifold. All spectra were corrected for absorption by the solution including the cell wall of the resonator, and the underlying continuum was subtracted for clarity. These spectra were collected with a high resolution grating 1,200 gr mm^{-1} blazed at 750 nm and 100 µm slit width.

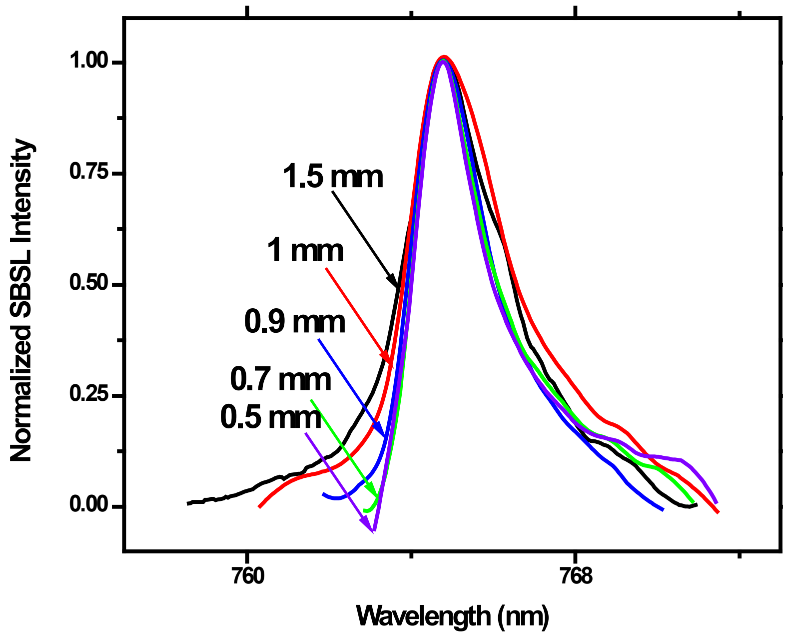

Figure SI 3. The isolated SBSL Ar atom 763.51 nm emission line during Z-perturbation. These spectra were collected with a high resolution grating 1,200 gr mm^{-1} blazed at 750 nm and 100 μm slit width and smoothed using the gentle Savitzky-Golay method (5 points of window).

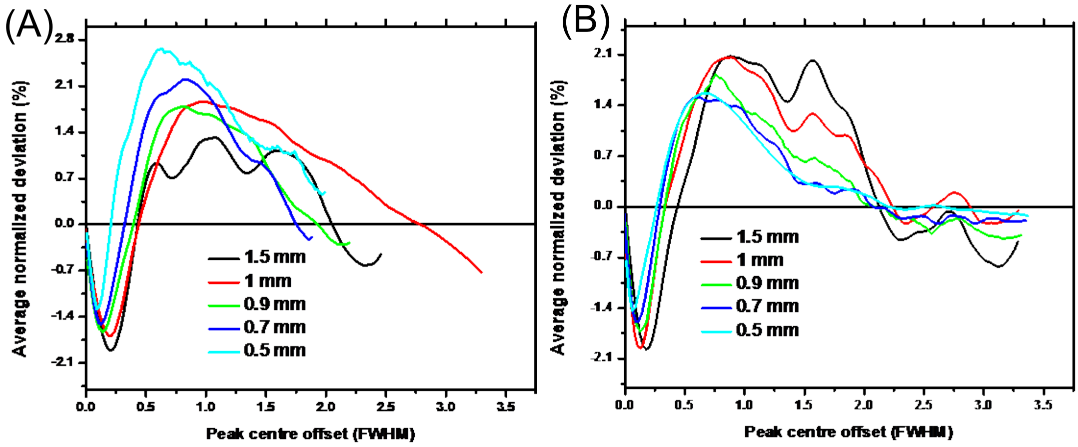

Figure SI 4. Average normalized deviation (%) of SBSL Ar atom emission spectra from best fits to a Lorentzian function during Z-perturbation (A) and X-perturbation (B) in 85 wt% H_2SO_4 regassed with Ar (5 %) at acoustic pressure 2.4 bar.

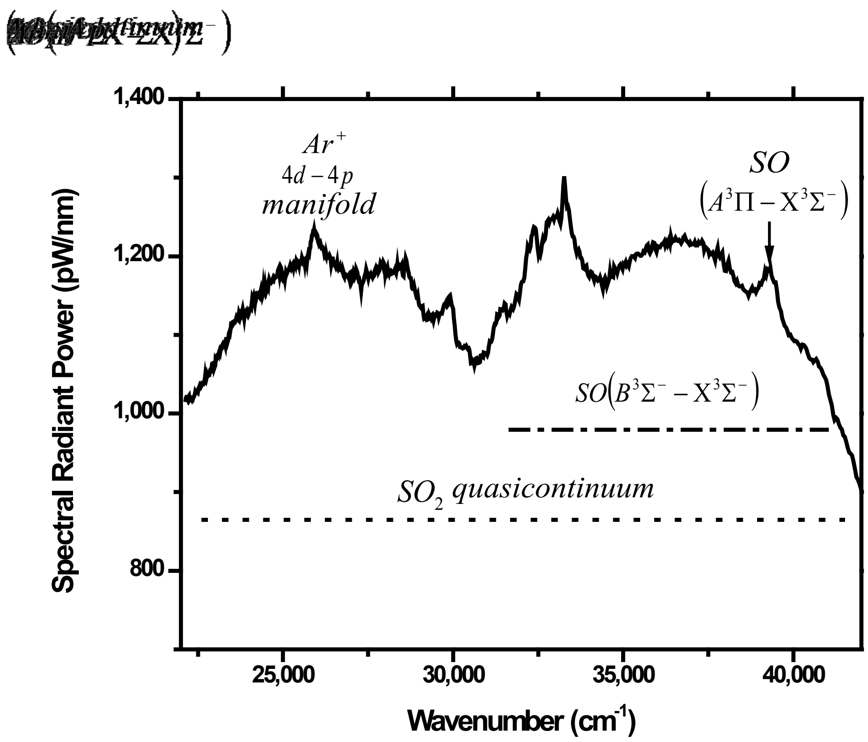

Figure SI 5. Spectral radiant power of SBSL with 5 % Ar in aqueous solution of 85 wt% H_2SO_4 at a perturbation distance 500 μm at 2.7 bar. Spectra were collected with 300 gr mm^{-1} blazed at 250 nm and 100 μm slit width.

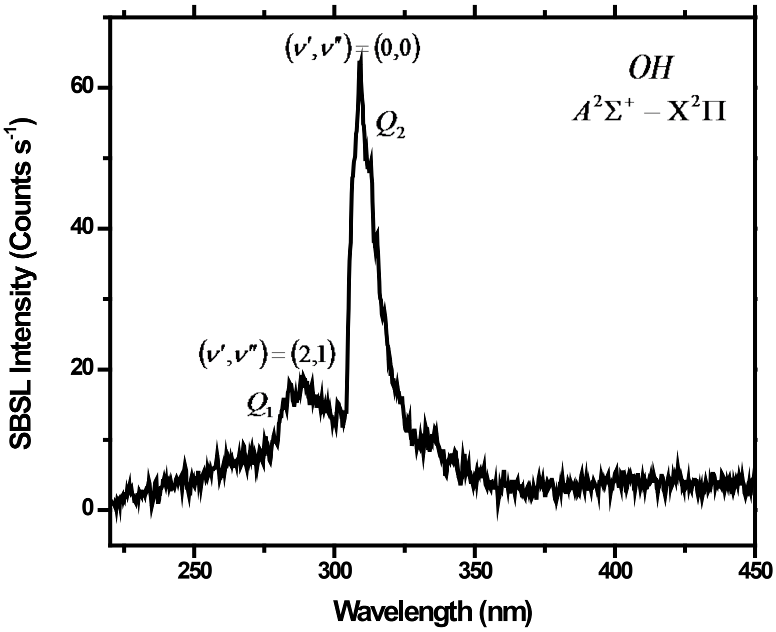

Figure SI 6. SBSL with 5 % Ar spectrum in deionized ultrapure water 18 MΩ · cm without perturbation. The intense peak at 308 nm with a shoulder (288 nm) is assigned to the OH ($A^2\Sigma^+$-$X^2\Pi$) transition.

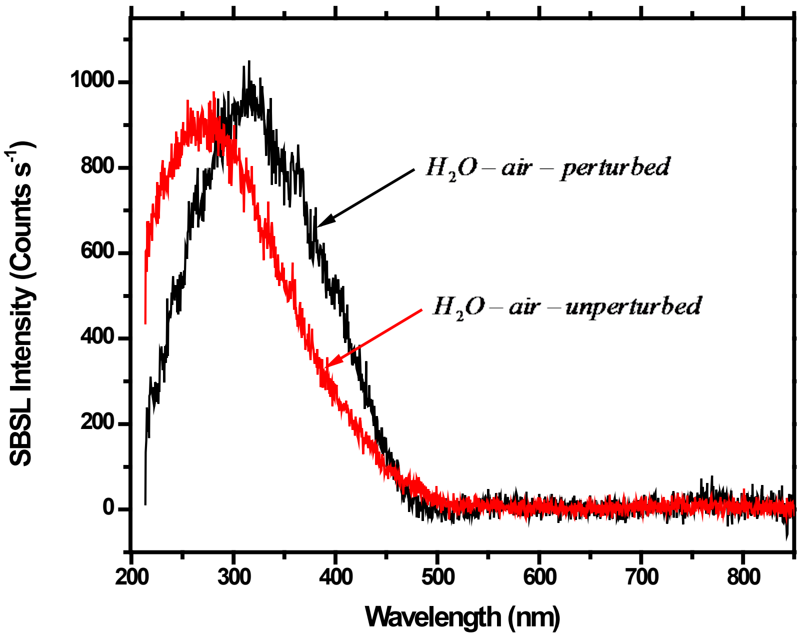

Figure SI 7. SBSL spectra in deionized ultrapure water 18 MΩ · cm with air during X-perturbation by a glass rod at applied acoustic pressure 1.17 bar at 19ºC. The spectra were collected with the average acquisition time 100 s (600 gr·mm^{-1} blazed at 300 nm grating and 250 µm slit width).