Electronic Supplementary Information

Use of NH($A^3\Pi$-$X^3\Sigma^-$) sonoluminescence for diagnostics of nonequilibrium plasma produced by multibubble cavitation

Rachel Pflieger, Temim Ouerhani, Thierry Belmonte, Sergey I. Nikitenko

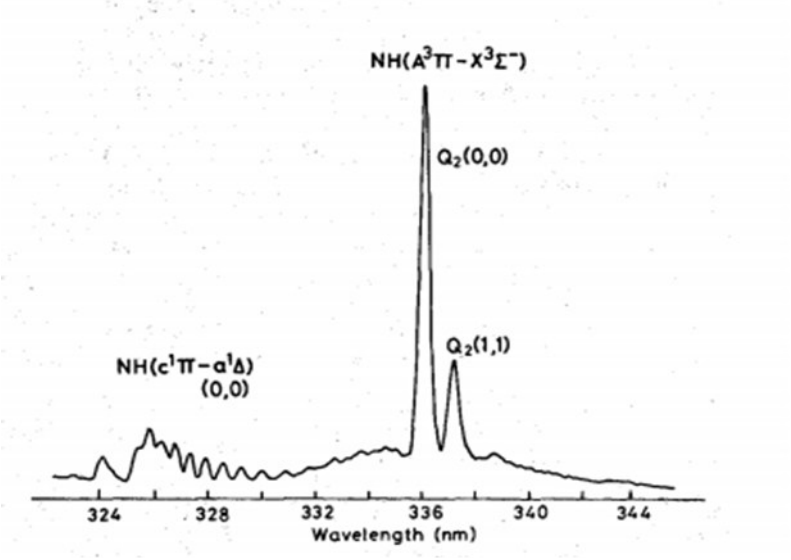

Fig. S1. Typical NH* emission spectrum observed in an Ar afterglow. The Ar pressure is 0.3 Torr and the NH_3 pressure is $3 \cdot 10^{-3}$ Torr. Spectral resolution is 4 Å. The spectrum was reproduced from Ref. 7.

Simulation of SL spectra with Specair software

Emissions of NH ($A^3\Pi$) and OH ($A^2\Sigma^+$) were simulated using Specair software. For each simulation, the variable parameters were the species vibrational temperature T_v, its rotational temperature T_r and the pressure p inside the collapsing bubble. The gas temperature was taken equal to T_r. Calculated spectra were convoluted with the experimental slit function to account for instrument broadening.

An automatic fitting tool of all parameters (T_v, T_r, p) is provided in Specair software, but does not lead to convergence in the particular case of SL spectra. This is due to a relatively high scattering in the signal (because of the low SL light intensity), a low spectral resolution and their strong broadening. Therefore it was necessary to optimize the various parameters manually in a row: T_v and T_r to reproduce the relative intensities of the different rovibronic transitions (e.g. for OH T_v reflects in the relative intensities of 0-0 at 309 nm, 1-1 at 312 nm and 2-2 at 315 nm, while T_r reflects in the relative intensities of the Q and R branches of 0-0 transition, at 307 & 309 nm), and p to fit the broadness of the peaks.

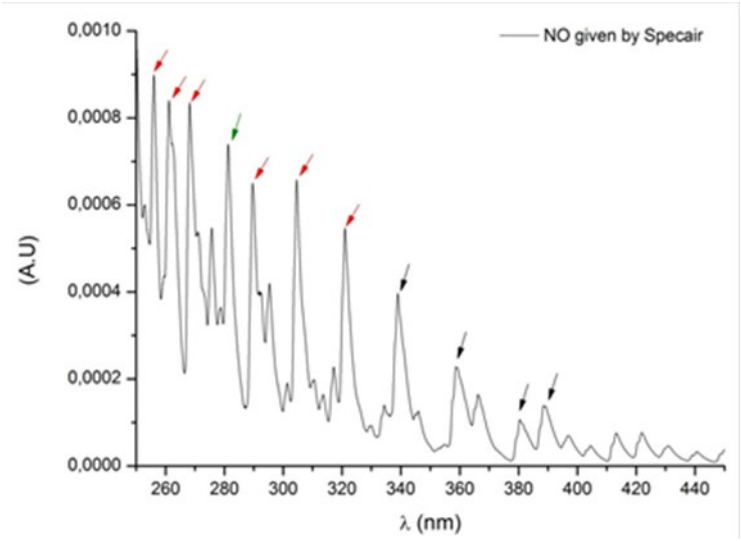

Fig. S2. NO emission spectrum simulated with Specair for T_v= 7000 K and T_r= 1000 K.

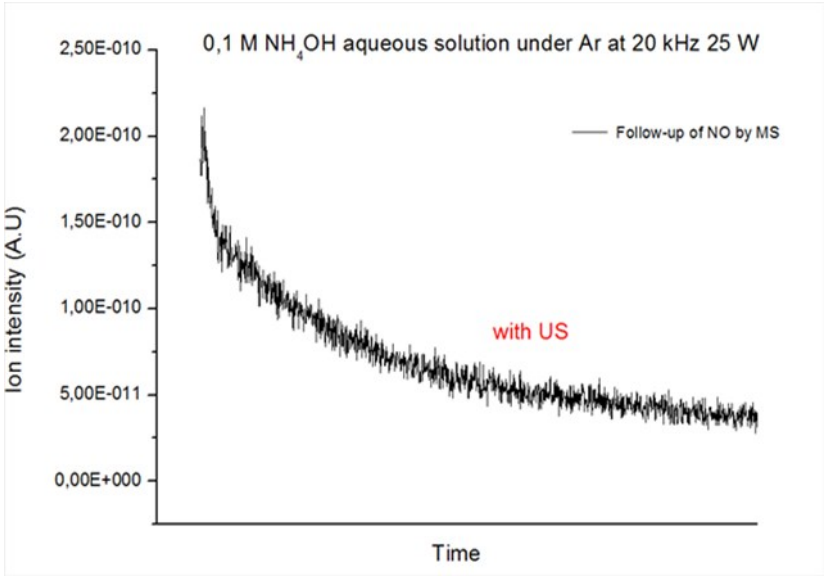

Fig. S3. Mass spectrometric signal of NO during sonolysis of 0.1M $NH_3 \cdot H_2O$ solution in the presence of Ar at 20 kHz ultrasound, P= 25 W, T= 20°C.