

Table S2: Detailed description of diffusion chamber components

#	Component	Description
1	Collimating lenses	The collimating lenses form a straight light beam penetrating the sample droplet.
2	Control panel for gas inflow	The control panel contains multiple gas inlets to connect up to six types of gases (e.g. N ₂ , O ₂ , CO ₂). In this study only one inlet was used and connected to a Wösthoff gas mixing pump, which supplied the desired gas mixture. Each inlet has one adjustable valve to regulate the incoming gas pressure.
3	Control wheel for gas distribution	Control wheel that directs the gas flow via a copper tube from a particular gas washing flask/gas (19) inlet to the sample chamber
4	Upper lens holder	The custom made upper plastic lens holder positions a collimating lens (1) connected to a fiber optic cable on top of the sample droplet.
5	Central metal block	The metal block contains the sample chamber and holds the sample holder (16) with the sample droplet and the pH optode (9). The metal block is ventrally penetrated by the central cylinder (14) to allow the passage of light through the sample. The metal itself allows fast temperature equilibration between the samples chamber and the surrounding medium.
6	Pressure balance tube	Tube that releases excess gas supplied by gas mixing pumps to avoid overpressure in the sample chamber.
7	Water disperser	The water disperser is connected to an external thermostatted water bath and assures rigorous mixing of water.
8	Gas dispersing membrane	Sponge-type membrane that disperses inflowing dry gas into temperature equilibrated water on top of the membrane.
9	pH optode	Micro pH optode that fitted onto the sample holder (16) to measure pH of the sample droplet
10	Lens spacer	The lens spacer is screwed on top of the lower lens holder (11) to assure a minimum distance of 10mm to the sample glass plate. The spacer also presses against the sample slide if the lower lens holder (11) is moved upwards, which seals the sample chamber from the surrounding gas atmosphere.
11	Lower lens holder	The custom made lower plastic lens holder positions a collimating lens (1) connected to a fiber optic cable below the sample droplet.
12	Locking bushing	Ring that moves the lower lens holder (11) upwards upon turning to fix the sample holder (16).
13	Sealing rings	The rubber sealing rings prevent gas leakage from the surrounding atmosphere into the sample chamber.
14	Central cylinder	The central hollow metal cylinder forms the light channel for the absorbance measurement and houses the upper (4) and lower (11) lens holders.
15	Water reservoir	Can be connected to a thermostatted water bath via insulated hoses, which circulates water or water mixed with anti-freeze agent to equilibrate all diffusion chamber components to the experimental temperature.
16	Sample holder	Plastic samples holder that carries the sample glass plate with the sample droplet at its end as well as the pH optode (9). The sample holder is moved into the central metal block (5) to position the sample droplet into the light beam in the center of the diffusion chamber.
17	Tygon® tubings	Gas tight tubings (CM Scientific Ltd., Silsden, U.K.) that connect the gas inlets with the gas-washing flasks (19) and the gas distributor (3).
18	Diffusion chamber housing	The housing of the diffusion chamber is made of acrylic glass and fixed with regular spaced metal screws. The inner sides are sealed with aquarium

sealing.

19	Gas-washing flask	The gas-washing flasks are composed of glass humidify the incoming gas to prevent drying and temperature changes of the sample droplet.
20	Thermostat connectors	To connect the water bath to an external circulating thermostatted water bath.
21	Temperature sensor	External temperature sensor connected to the pH recorder to monitor the temperature of the diffusion chamber during measurements.
22	Fiber optic cable	Fiber optic cable from the UV-VIS light source fixed to the collimating lens (1) and housed in the upper lens holder (4).

