

Supporting Information

Profiling an Electrospray Plume by Laser-Induced Fluorescence and Fraunhofer Diffraction Combined to Mass Spectrometry: Influence of Size and Composition of Droplets on Charge-State Distributions of Electrosprayed Proteins.

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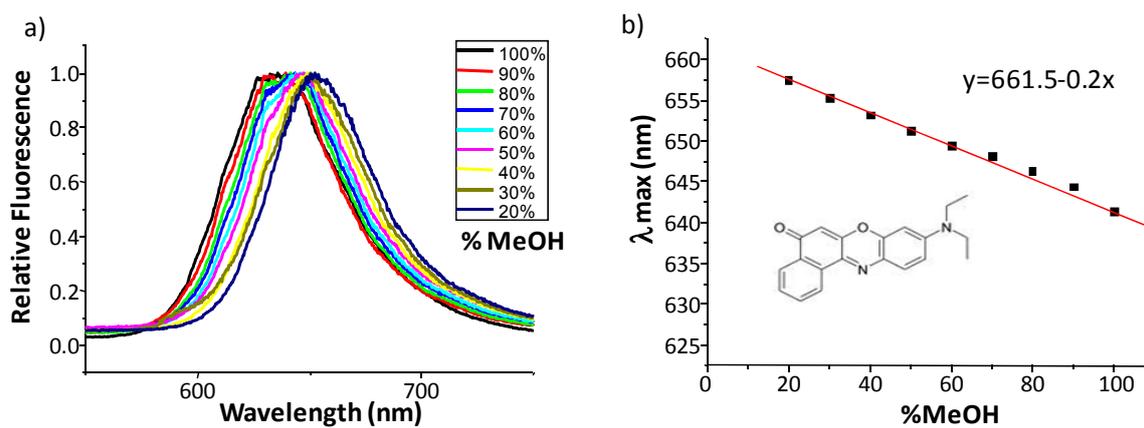


Fig. S1. a) Fluorescence spectra of 20 μM Nile Red in MeOH/water binary mixtures at various compositions contained in a 1-cm cuvette. Excitation wavelength: 532 nm; exposition time: 5 ms; 10 averaged scans. b) Calibration curves showing the maximum of emission λ_{\max} versus the percentage of MeOH.

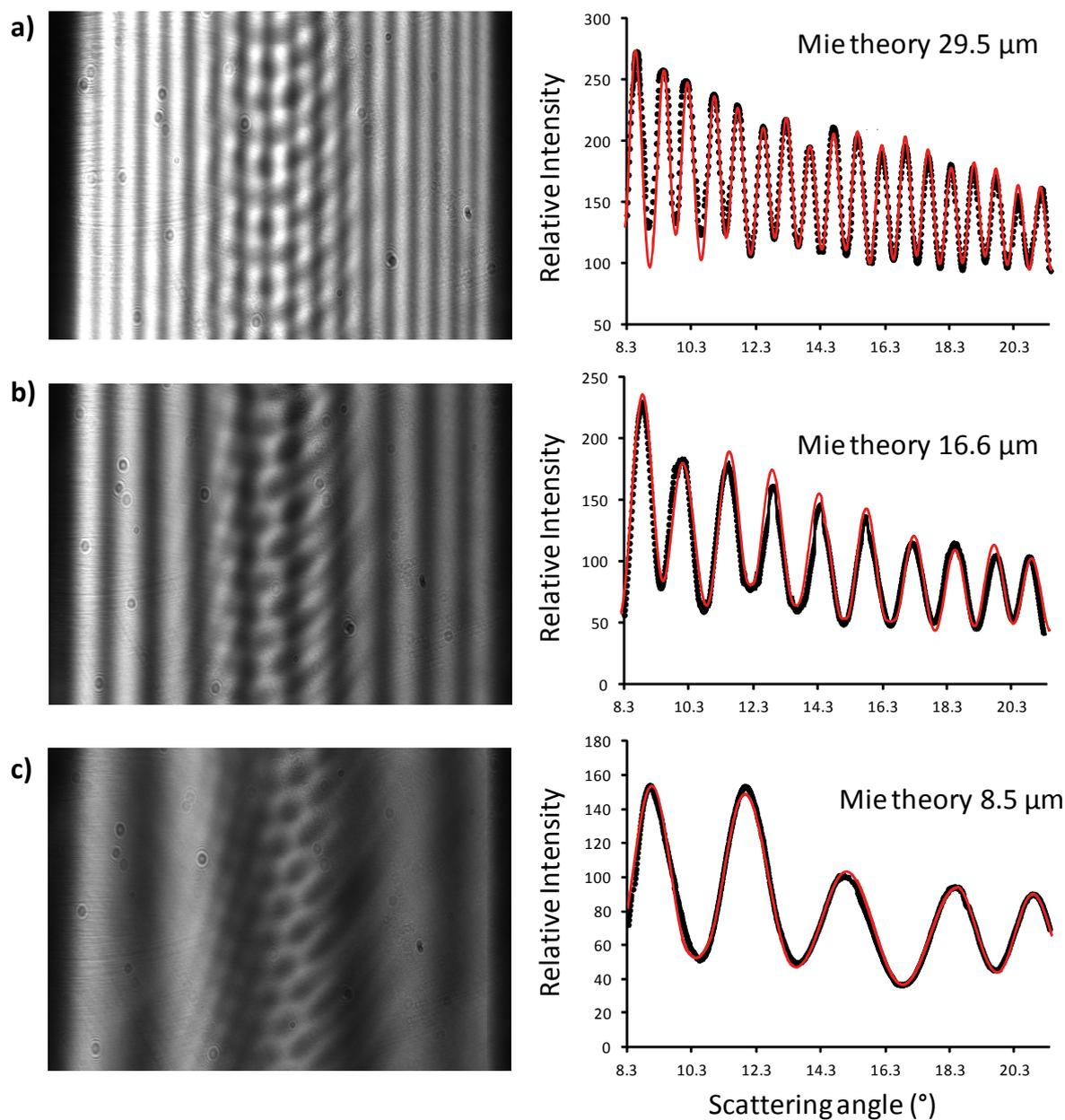


Fig. S2. (left) Raw images of Mie scattering recorded with the CCD camera from different size droplets of water (using the droplet generator). (right) projection of the interference fringes as a function of the scattering angle θ , and comparison between experiment (black dots) and simulation (red line) using Mie theory for monodispersed droplets. Exposition time: 10 ms. Different droplet sizes were obtained by modifying the generator parameters: impulsion frequency between 400 and 620 Hz; pulse length between 25 and 40 μs and pulse voltage between 190 and 250 mV.

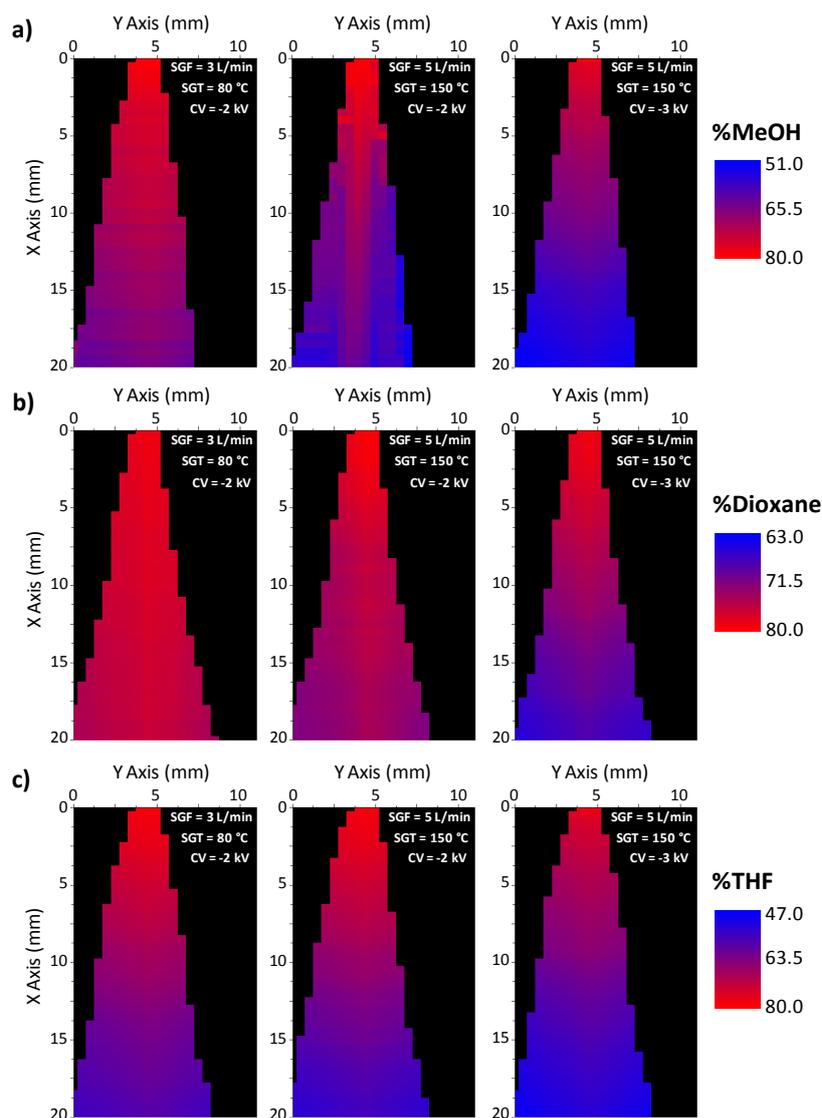


Fig. S3. a) XY images of the percentage of MeOH in the plume (from the fluorescence of 20 μM Nile Red in an initial mixture of MeOH/water 80:20 % v/v sprayed in negative ion mode) at different sheath gas flow rates (SGF = 3 L/min and 5 L/min from the left to the right), temperatures (SGT = 80 °C and 150 °C from the left to the right) and capillary voltages (CV = -2 kV and -3 kV from the left to the right). b) XY images of the percentage of dioxane in the plume (from the fluorescence of 20 μM Nile Red in an initial mixture of dioxane/water 80:20 % v/v) at different sheath gas flow rates (SGF = 3 L/min and 5 L/min from the left to the right), temperatures (SGT = 80 °C and 150 °C from the left to the right) and capillary voltages (CV = -2 kV and -3 kV from the left to the right). c) XY images of the percentage of THF in the plume (from the fluorescence of 20 μM Nile Red in an initial mixture of THF/water 80:20 % v/v) at different sheath gas flow rates (SGF = 3 L/min and 5 L/min from the left to the right), temperatures (SGT = 80 °C and 150 °C from the left to the right) and capillary voltages (CV = -2 kV and -3 kV from the left to the right). The irradiation time for each step was set to 5 s. The image is constituted of 943 points and the total acquisition time for an image is 4715 s.

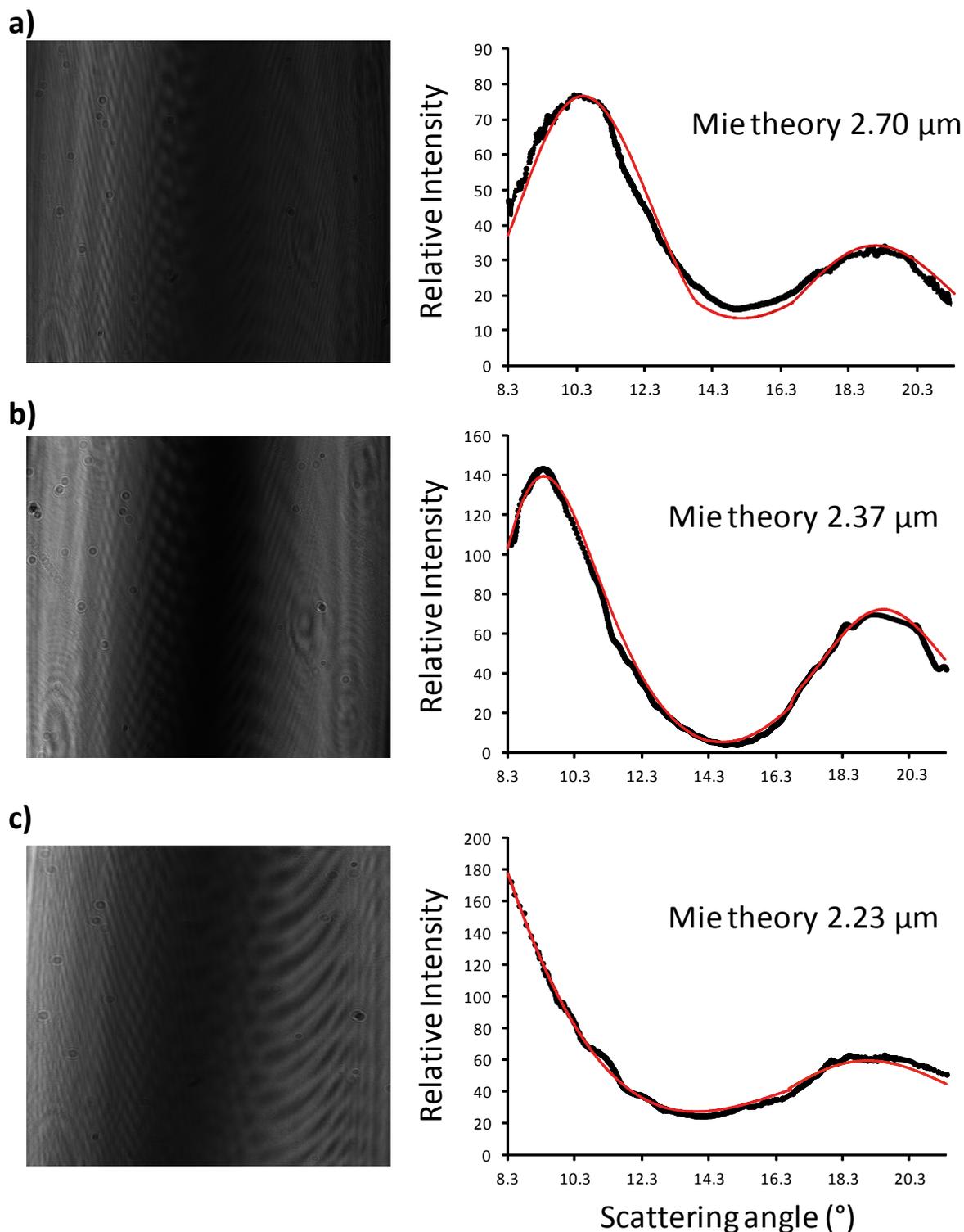


Fig. S4. (left) Raw images of Mie scattering in the ESI plume at $X = 1$ mm (a), $X = 10$ mm (b) and $X = 20$ mm (c) (with $Y = 3.5$ mm). (right) projection of the interference fringes as a function of the scattering angle and comparison between experiment (black dots) and simulation (red line) using Mie theory with a Gaussian dispersion (standard deviation $\sigma = 1.3$ % (a), 1.2 % (b) and 2.1 % (c)). The spray was produced in negative ion mode with a solution of 20 μM Nile Red in dioxane/water binary mixture at 80:20 % (v/v) and ionization parameters were: SGF = 3 L/min, SGT = 80 °C. Capillary voltage was -2 kV.

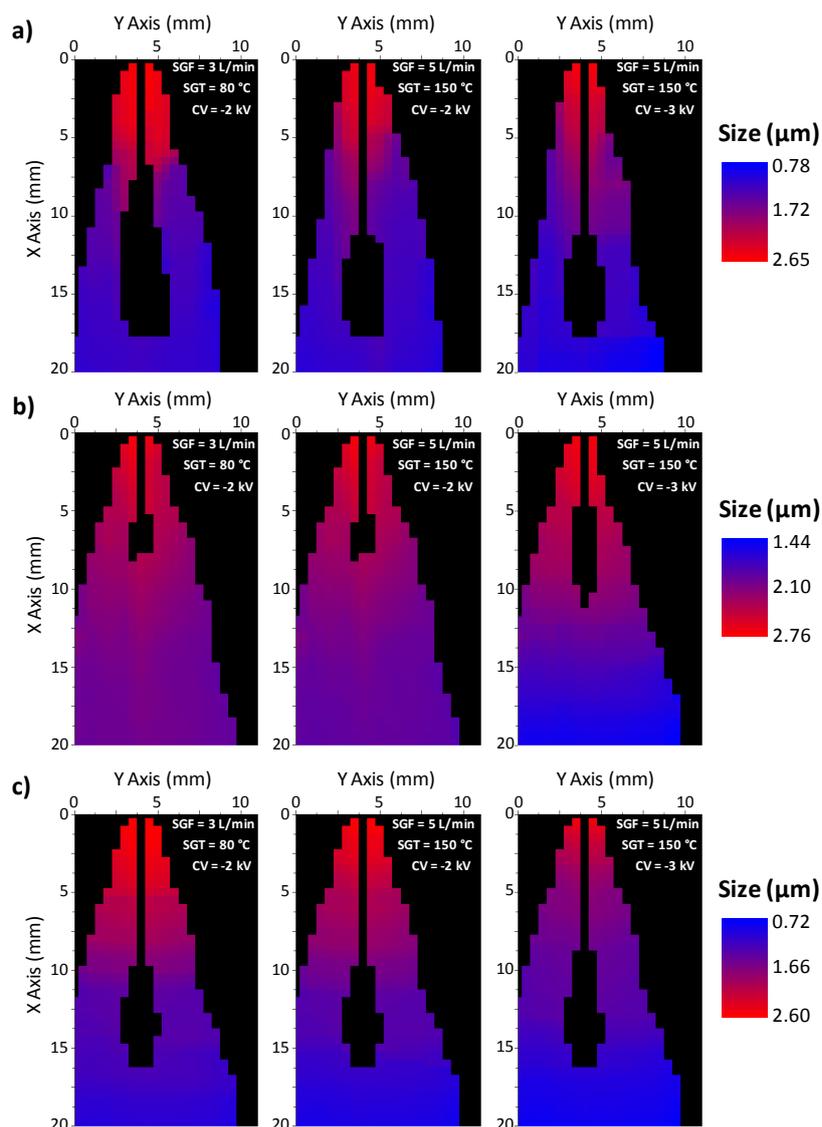


Fig. S5. a) XY images of the droplet size in the plume (from scattering images) for a sprayed solution of 20 μM Nile Red in a 80:20 (% v/v) initial mixture of MeOH/water at different sheath gas flow rates: SGF = 3 L/min and 5 L/min from the left to the right, temperatures: SGT = 80 $^{\circ}\text{C}$ and 150 $^{\circ}\text{C}$ from the left to the right, and capillary voltages: CV = -2 kV and -3 kV from the left to the right. b) XY images of the droplet size in the plume (determined from scattering images) for a sprayed solution of 20 μM Nile Red in a 80:20 (% v/v) initial mixture of dioxane/water at different sheath gas flow : SGF = 3 L/min and 5 L/min from the left to the right, temperatures: SGT = 80 $^{\circ}\text{C}$ and 150 $^{\circ}\text{C}$ from the left to the right, and capillary voltages: CV = -2 kV and -3 kV from the left to the right. c) XY images of the droplet size in the plume (determined from scattering images) for a sprayed solution of 20 μM Nile Red in a 80:20 (% v/v) initial mixture of THF/water at different sheath gas flow : SGF = 3 L/min and 5 L/min from the left to the right, temperatures: SGT = 80 $^{\circ}\text{C}$ and 150 $^{\circ}\text{C}$ from the left to the right, and capillary voltages: CV = -2 kV and -3 kV from the left to the right. The exposition time for each step was set to 1 s. The image is constituted of 943 points and the total acquisition time for an image is 4715 s.

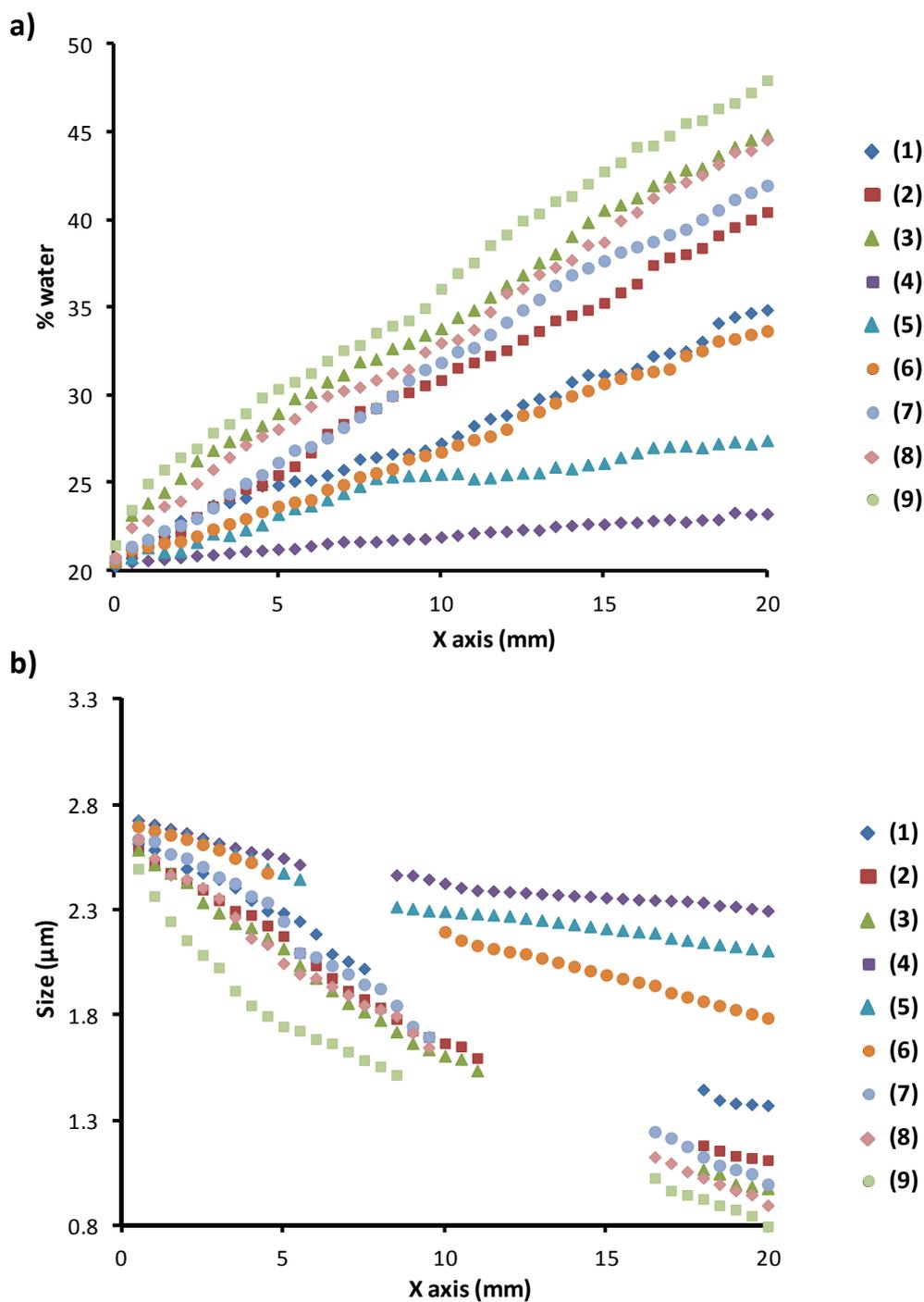


Fig. S6. Plots of the water percentage (a) and the droplet size (b) in the spray plume versus the axial distance X from the emitter tip determined from a sprayed solution of 20 μM Nile Red in a 80:20 (% v/v) initial mixture of MeOH/water (curves 1-3), dioxane/water (curves 4-6) and THF/water (curves 7-9). Sheath gas parameters were: curves 1, 4 and 7, SGF = 3 L/min and SGT = 80 $^{\circ}\text{C}$; curves 2, 3, 5, 6, 8 and 9, SGF = 5 L/min and SGT = 150 $^{\circ}\text{C}$. Capillary voltage was: curves 1, 2, 4, 5, 7 and 8, CV = -2 kV; curves 3, 6 and 9, CV = -3 kV in the negative ion mode. Y = 3.5 mm.

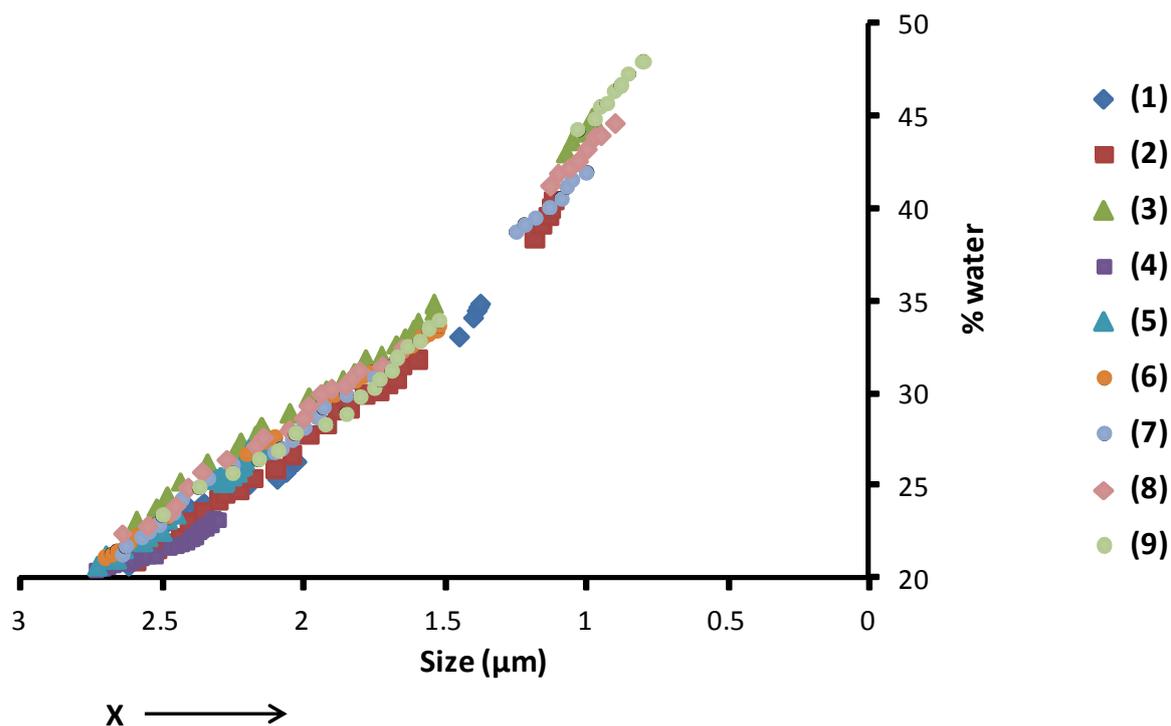


Fig. S7. Plots of the water percentage values in the spray plume versus the droplet size determined from a sprayed solution of 20 μM Nile Red in a 80:20 (% v/v) initial mixture of MeOH/water (curves 1-3), dioxane/water (curves 4-6) and THF/water (curves 7-9). Sheath gas parameters were: curves 1, 4 and 7, SGF = 3 L/min and SGT = 80 °C; curves 2, 3, 5, 6, 8 and 9, SGF = 5 L/min and SGT = 150 °C. Capillary voltage was: curves 1, 2, 4, 5, 7 and 8, CV = -2 kV; curves 3, 6 and 9, CV = -3 kV in the negative ion mode. Y = 3.5 mm.