Supplementary Information (SI) for Environmental Science: Processes & Impacts.

Supporting Information for

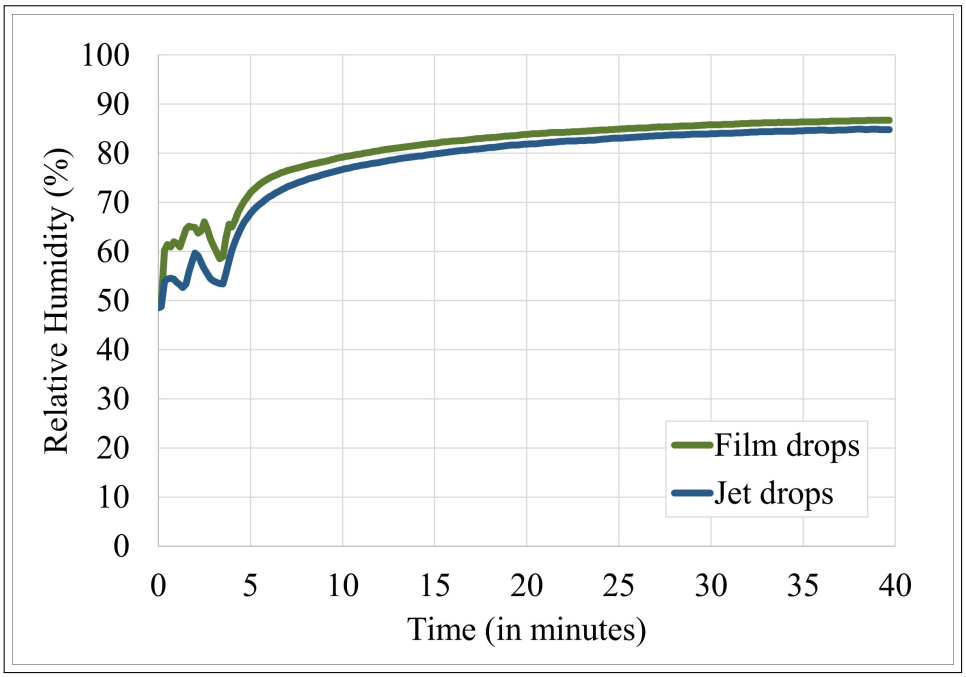
Effect of wettability on microplastics aerosolization via film and jet drops ejected from bursting bubbles

Nishan Pokhrel and Hosein Foroutan*

*Corresponding author e-mail: hosein@vt.edu

This PDF file includes:

Figs. S1 to S6



(a)

Fig. S1. Time series of relative humidity (RH) measurements of film and jet drop-laden air just before it entered the aerosol sizing instruments.

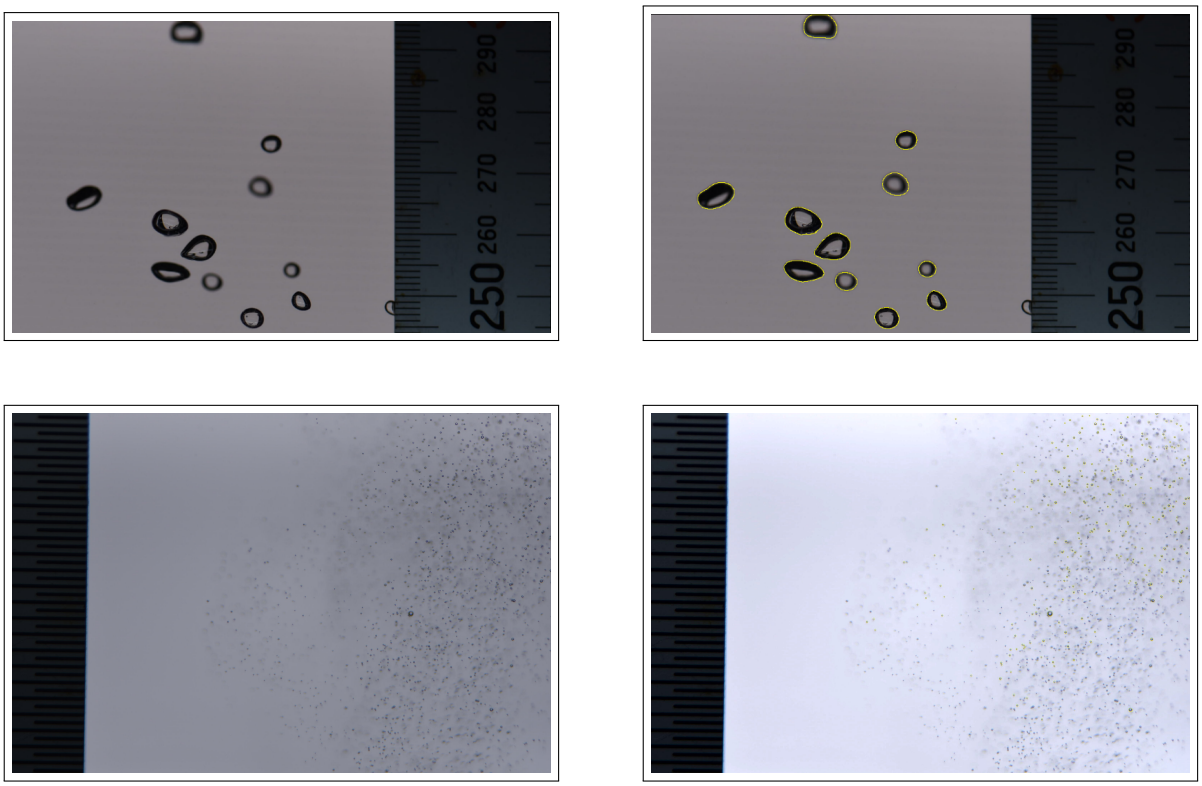


Fig. S2. Side-view images for coarse (top) and fine (bottom) bubbles rising in the SAPT with a precision ruler for scale, and the corresponding image on the right shows the manually identified bubbles highlighted in yellow using ImageJ software.

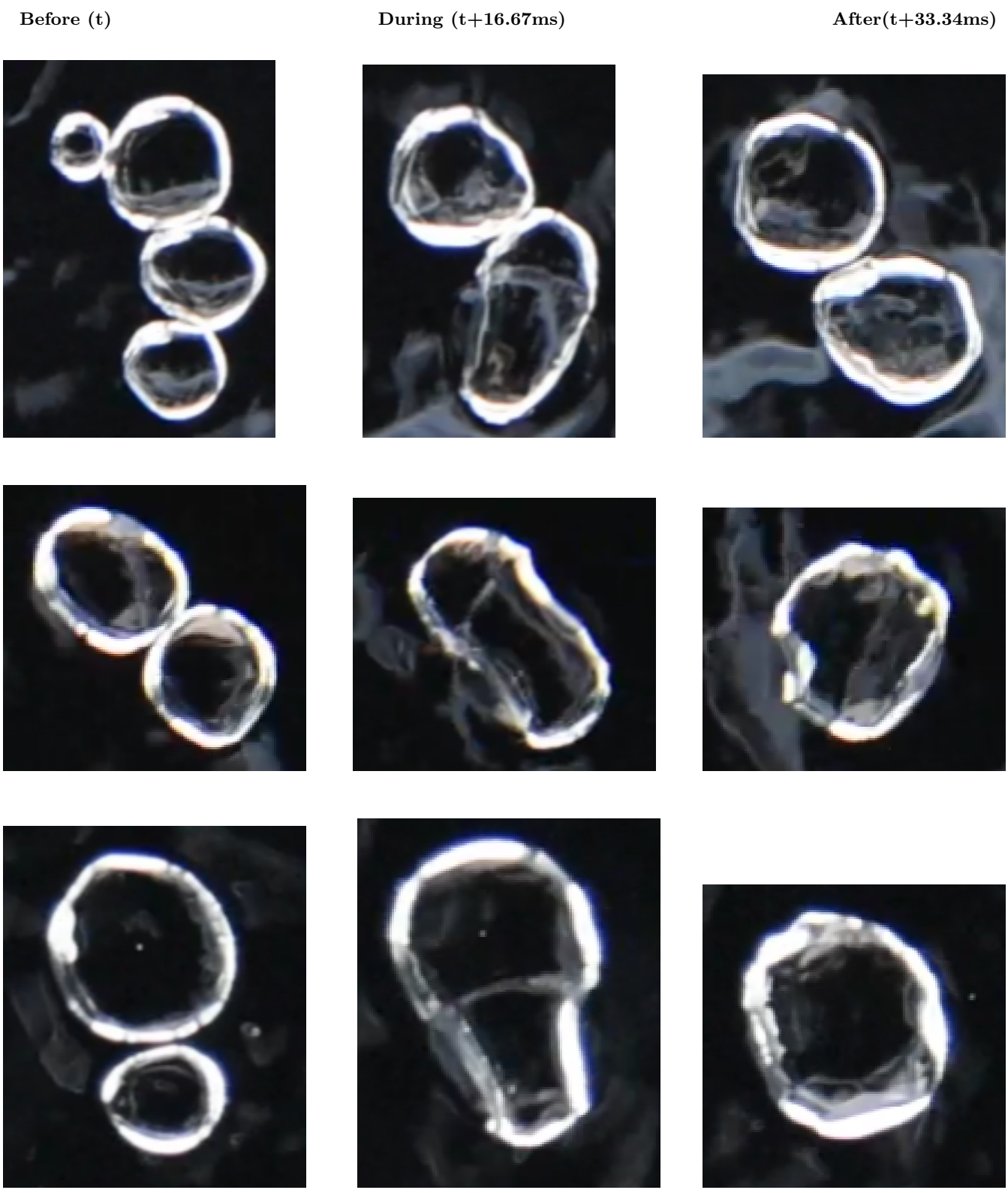
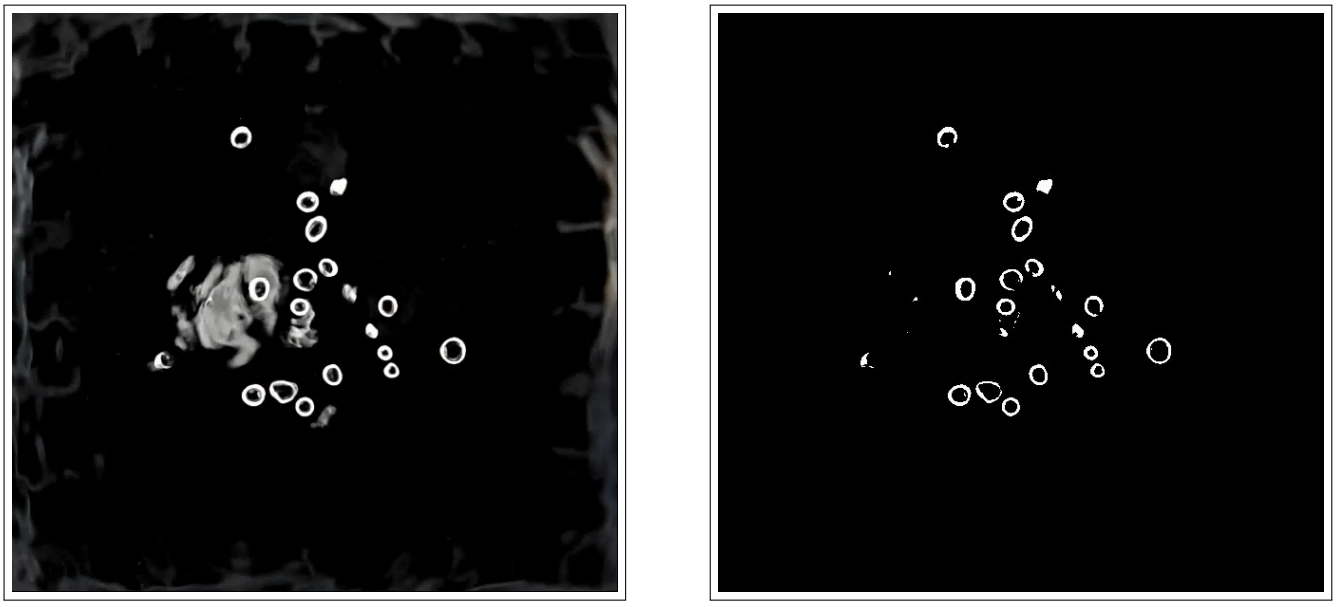
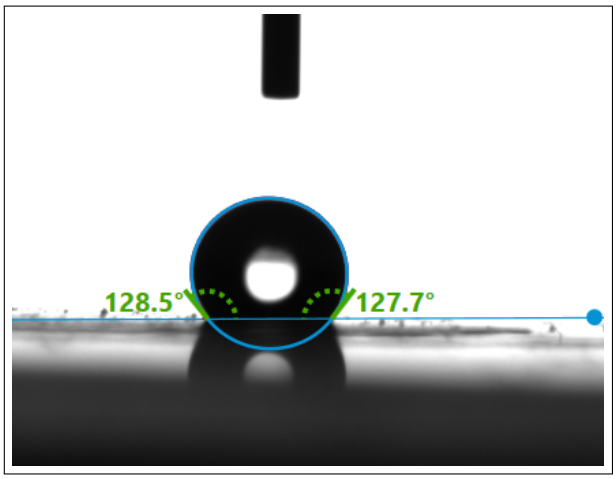


Fig. S3. Example images of coarse bubble coalescence observed on the surface of the SAPT. Each row shows consecutive frames of a 60 FPS video showing a different bubble before, during, and after coalescence. Coalescence may have occurred at any point between frames, but the temporal resolution is limited to 16.67 ms.

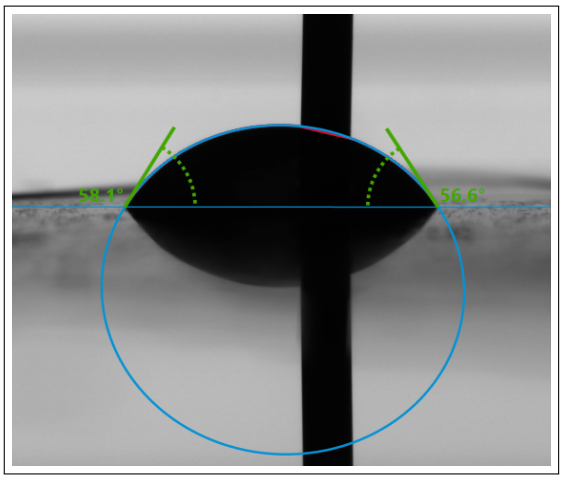


(a) (b)

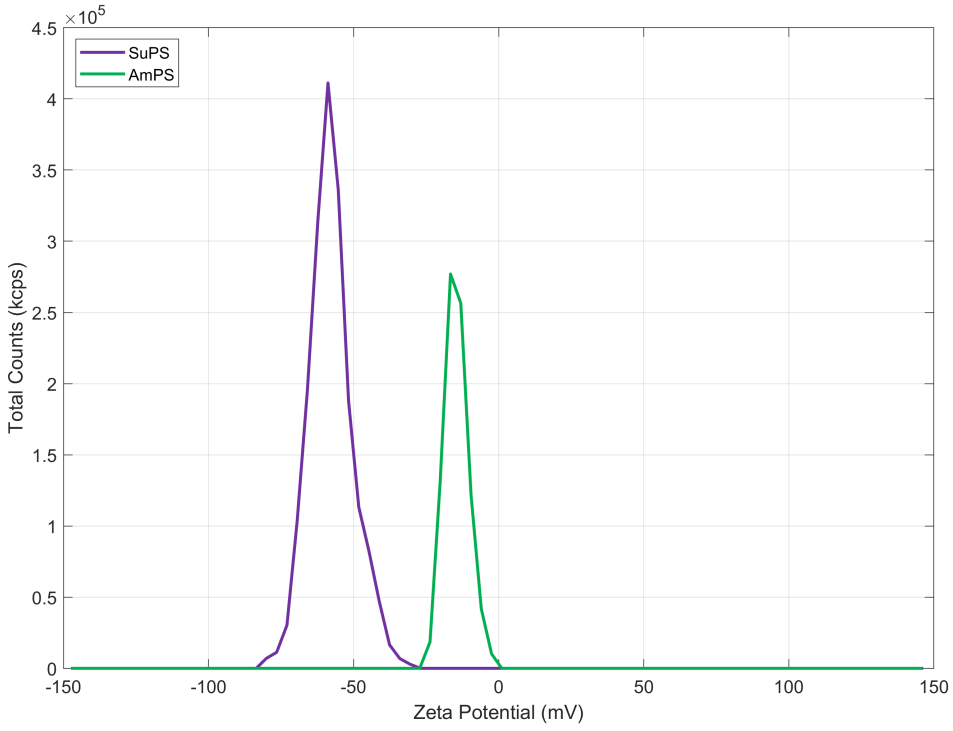
Fig. S4. Top-view images of coarse bubbles sitting at the water surface before bursting, and the corresponding thresholded version generated using ImageJ that distinguishes the surface bubbles from the background. While the 'Fill Holes' function in ImageJ could have been used to render the bubbles as solid rather than hollow circles, it was not applied post-thresholding, as not all bubbles exhibited a clearly enclosed structure. Consequently, this method does not strictly quantify the fraction of bubbles within the frame but rather the fraction of white pixels present. However, since the same method was consistently applied across all samples, and the primary objective was to assess the rate of change in area and the relative area differences between SuPS and AmPS experiments rather than the absolute bubble area, filling the holes was deemed unnecessary.



(a)



(b)



(c)

Fig. S5. Surface characterization of MP particles used in this study. Images in the top row show sessile drop contact angle measurements for (a) SuPS and (b) AmPS covered surfaces. The bottom image (c) shows the zeta potential distribution for SuPS and AmPS polystyrene particles suspended in ultrapure water. The distributions show mean zeta potentials of -57.78 mV for SuPS and -14.54 mV for AmPS. Measurements were conducted at a concentration of 10^{12} particles per liter (PPL).

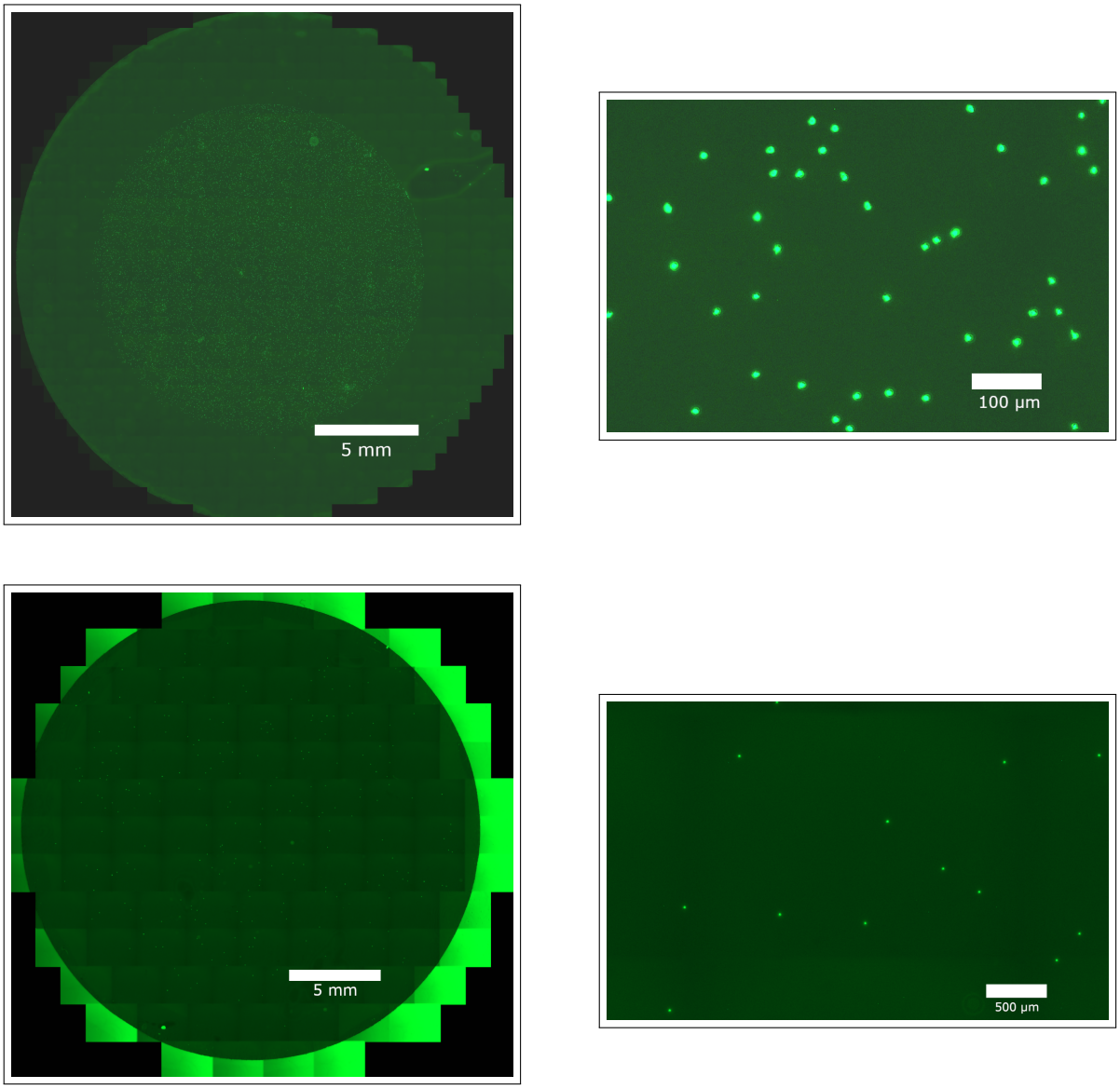


Fig. S6. Fluorescent scans of water (top) and air (bottom) filter samples containing 1 µm fluorescent SuPS particles. The corresponding magnified views of the filter samples are shown on the right. Particles appear larger than their true size due to a halo or blur effect around them because of the fluorescence emission, the degree of which depends on, among other things, the brightness value selected in the Fluorescence microscope. Also, we observed minimal amount of particle overlapping in the scans, thus limiting undercounting of particles.