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Reconsideration of surface tension and phase state effects on cloud condensation nuclei activity based on the atomic force microscopy measurement

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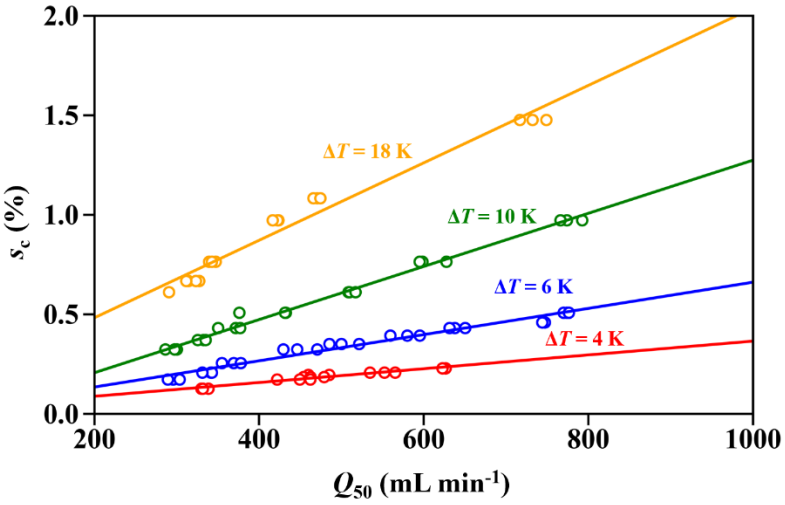

Figure S1: Illustration of SFCA calibration measurements performed with AS (for ΔT = 4 K, 6 K, 10 K and 18 K). The slope and intercept of the 4 K line are 0.00034657 and 0.018893; the slope and intercept for the 6 K are 0.00065835 and 0.003186; the slope and intercept for the 10 K are 0.00133500 and 0.060370 and the slope and intercept for the 18 K are 0.00194577 and 0.09362373.

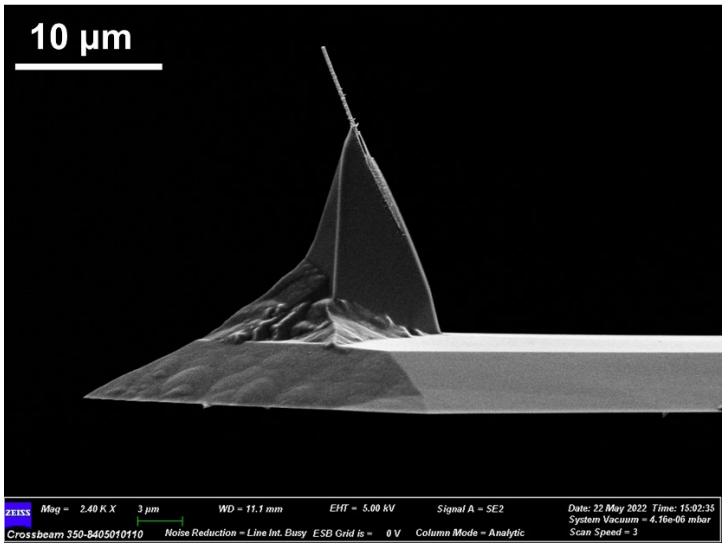

Figure S2: SEM image of a custom-built high aspect ratio (HAR) platinum nanoneedle with constant diameter.

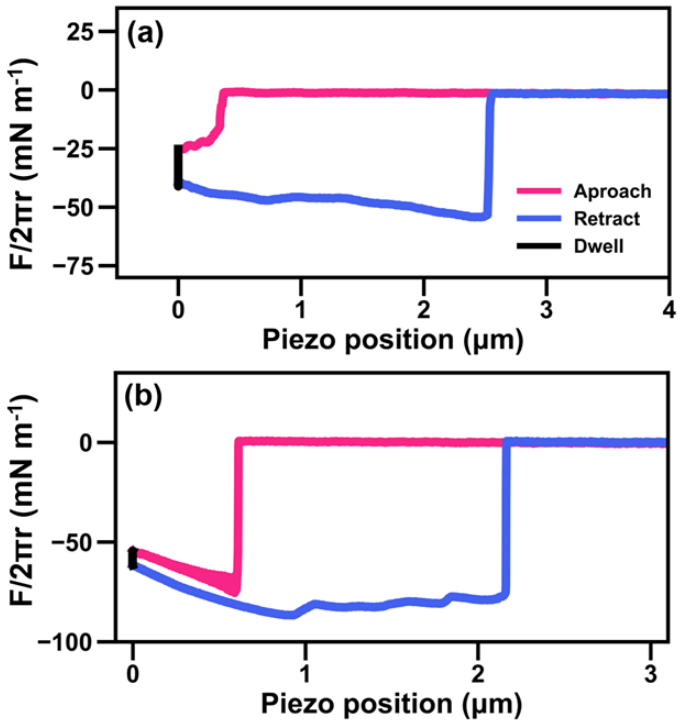

Figure S3: Force (F) plots of bulk surface tension experiment using AFM on (a) 1, 3-propanediol and (b) water, diameter values were obtained roughly from SEM picture of needle. Pink, blue and black lines indicate approaching progress, retracting progress and dwell, respectively. The surface tension of water and 1, 3-propanediol were 73.6 mN m^{-1} and 48.7 mN m^{-1}, being consistent to results in previous study (Romero and Paéz, 2006). Though SEM picture could obtain rough dimeter values, calibration by measuring water surface tension were performed before submicron particles experiments for precise dimeter (Kaluarachchi et al., 2021).

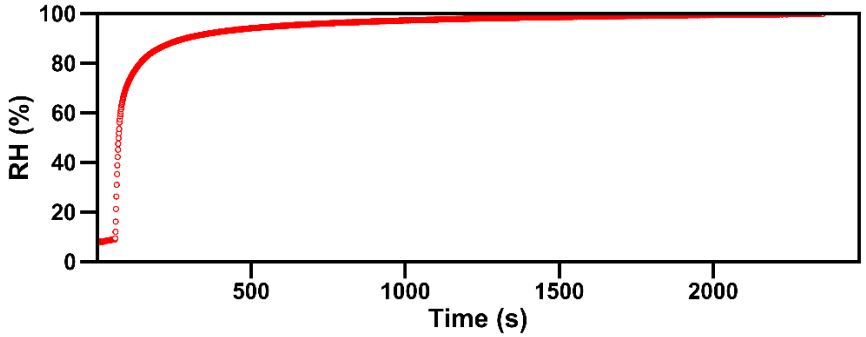

Figure S4: RH variation in AFM cell. RH increased from 10% to over 99.5% in around 40 minutes.

Reference

Kaluarachchi, C. P., Lee, H. D., Lan, Y., Lansakara, T. I., and Tivanski, A. V.: Surface tension measurements of aqueous liquid-air interfaces probed with microscopic indentation, Langmuir, 37, 2457-2465, https://doi.org/10.1021/acs.langmuir.0c03507, 2021.

Romero, C. M. and Paéz, M. S.: Surface tension of aqueous solutions of alcohol and polyols at 298.15 K, Phys. Chem. Liq., 44, 61-65, https://doi.org/10.1080/01421590500315360, 2006.