Atmospheric
Measurement
Techniques

Supplement of

High-humidity tandem differential mobility analyzer for accurate determination of aerosol hygroscopic growth, microstructure, and activity coefficients over a wide range of relative humidity

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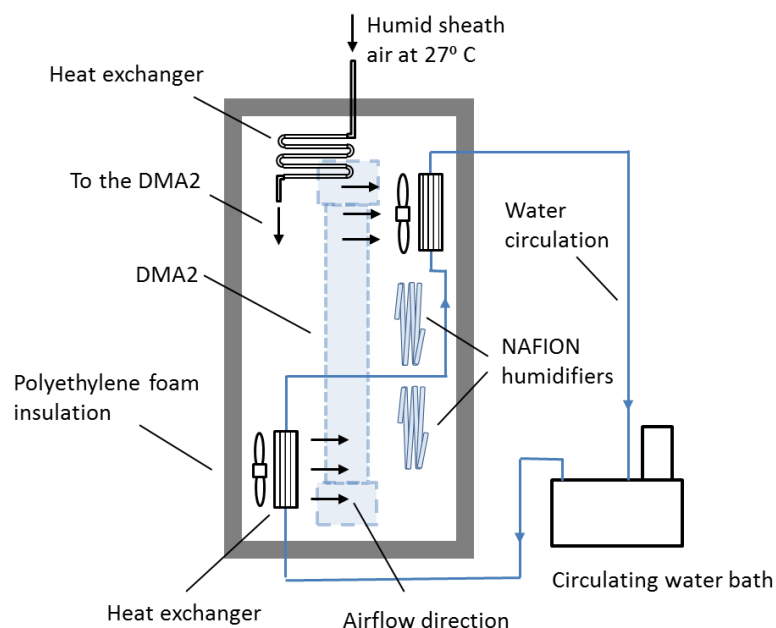# Supplementary material

S.1 HHTDMA setup.

Fig. S1.1 Schematic diagram of the temperature-controlled DMA2 box.

The test measurements showed that the temperature difference between the sheath and excess flows can be changed by ±0.3 ℃ by adjusting the rotation speed of the fans. The speed of each fan is affected by applied AC voltage.
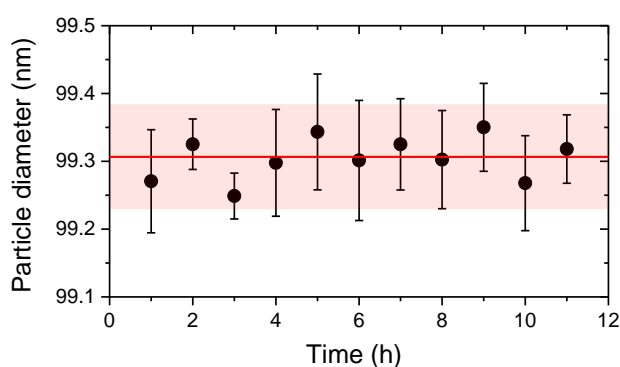

Fig. S1.2 Dry particle stability characterized by test measurement of initial mobility diameter ($D_{b,i}$) as selected with DMA1 and measured with DMA2 for ammonium sulfate particles over the full duration of an H-TDMA experiment (~10 h). Symbols and error bars represent the mean ±2 standard deviation (σ) of five-seven repeated measurements. Red line and fill area are the average of the all - 76 data points ±2σ, respectively.
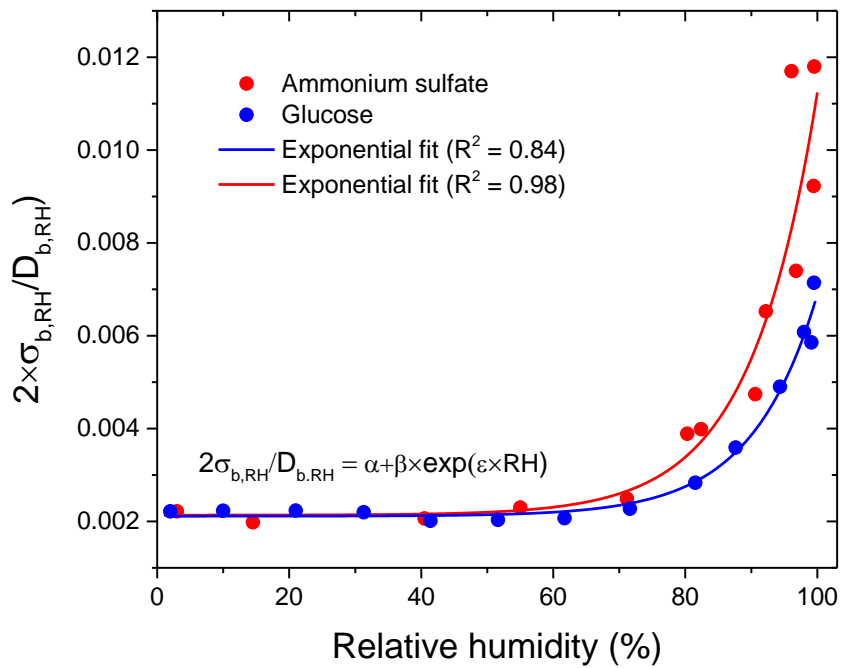
Fig. S1.3 Relative uncertainty ($2\sigma_{b,RH}/D_{b,RH}$) of DMA-2 measured mobility diameters as function of relative humidity and corresponding exponential fitting curves.

The best fitting parameters of exponential function for ammonium sulfate (AS) and glucose (Gl) aerosol particles are $\alpha_{AS} = 0.0021$; $\beta_{AS} = 4.4391 \cdot 10^{-7}$; $\varepsilon_{AS} = 0.0993$ and $\alpha_{Gl.} = 0.0021$; $\beta_{Gl} = 2.0508 \cdot 10^{-7}$; $\varepsilon_{Gl} = 0.1006$, respectively.