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 °C 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 ($\sigma$) of five-seven repeated measurements. Red line and fill area are the average of the all -76 data points ±2$\sigma$, 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 $\alpha_{AS} = 0.0021; \beta_{AS} = 4.4391 \times 10^{-7}; \varepsilon_{AS} = 0.0993$ and $\alpha_{Gl} = 0.0021; \beta_{Gl} = 2.0508 \times 10^{-7}; \varepsilon_{Gl} = 0.1006$, respectively.