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ELECTRONIC SUPPLEMENTARY INFORMATION

Linking hygroscopicity and the surface microstructure of model inorganic salts, simple and complex carbohydrates, and authentic sea spray aerosol particles

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Notes

The authors declare no competing financial interest.

A. TABLES AND FIGURES

Table S1: Summary of the fitting parameters used in Equation 4 at 85% relative humidity of biologically derived compounds that show deliquescence.

Chemical compound	*a*	*b*	*c*
Glucose	0.1090	0.5250	-0.5600
Sucrose	0.1751	0.4355	-0.5605
Maltose	0.0751	0.5355	-0.5805
Sodium alginate	0.1925	0.0482	-0.1900
LPS	0.008025	0.2052	-0.1590
Laminarin	0.0051	0.00845	0.02505

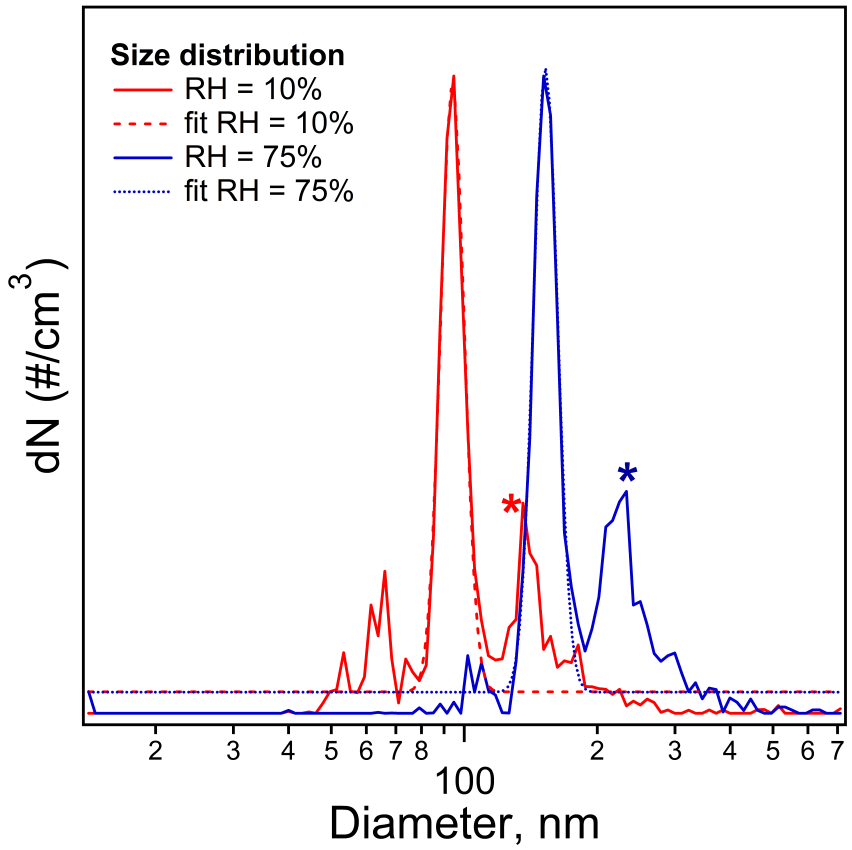

Figure S1: Size-selected monodisperse aerosol population undergoing homogeneous hygroscopic growth. The asterisks are the larger, doubly-charged particles with the same electrical mobility as that of the singly-charged particles that can be transmitted through the classifying DMA.[1]

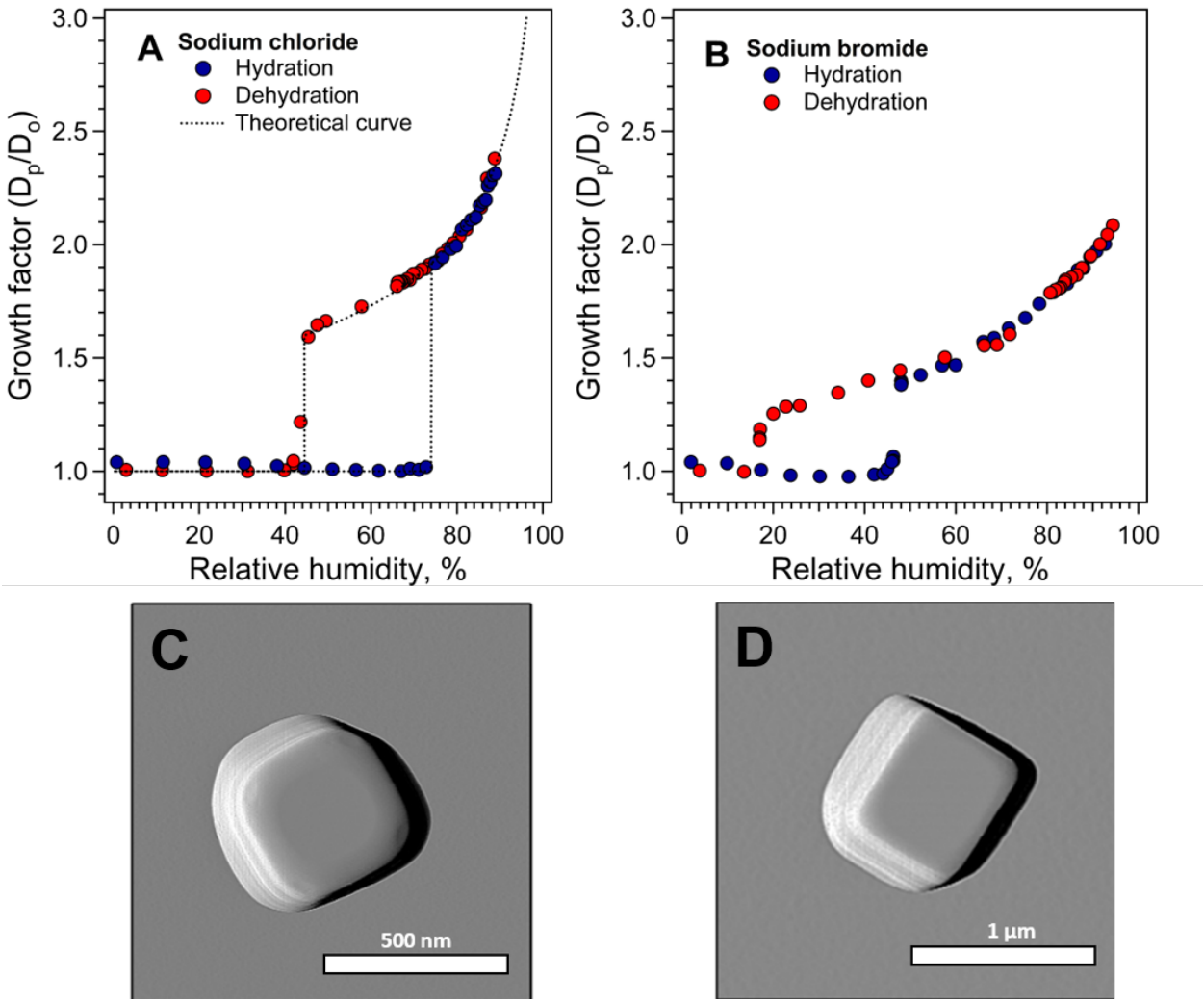

Figure S2: Hydration and dehydration curves of D_o = 100 nm of (A) NaCl and (B) NaBr particles as a function of RH measured by HTDMA. Amplitude AFM image of (C) NaCl and (D) NaBr individual particles displaying cubic crystalline morphology and microstructure showing steps and corner sites. Theoretical curve for the NaCl hydration is the E-AIM modeling result. The measured growth factor for dry NaCl were corrected by the shape factor of 1.08 as suggested by Kelly and McMurry.[2]

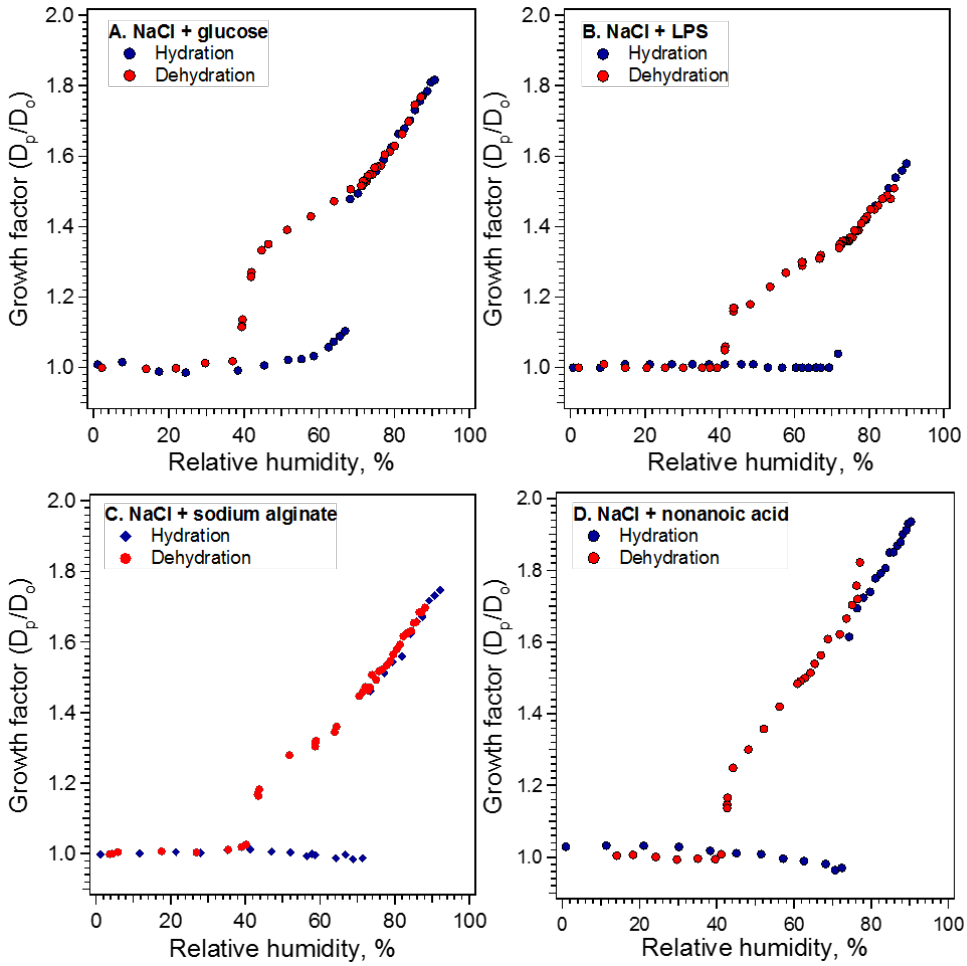

Figure S3: Complete hydration and dehydration profile of 2-component mixture of (A) 2:1 mass ratio of NaCl/glucose; (B) 1:1 mass ratio of NaCl/LPS; (C) 2:1 mass ratio of NaCl/sodium alginate; and (D) 1:1 mass ratio of NaCl/nonanoic acid.

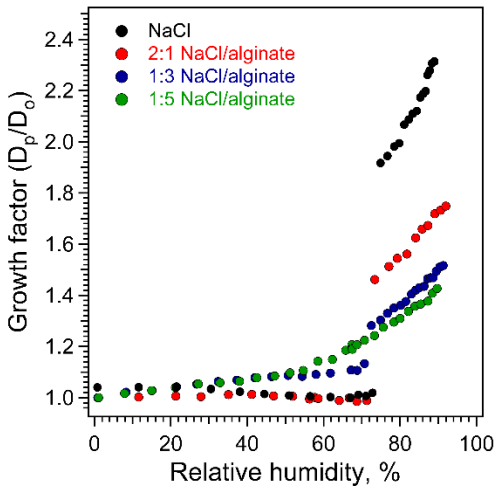

Figure S4: Effect of varying the organic mass fraction on the water uptake of mixed NaCl/sodium alginate particles. With increasing organic mass fraction, decrease in the growth factor and suppression of the deliquescence point are seen.

B. CALCULATION OF THE HYGROSCOPICITY PARAMETER, κ

The hygroscopicity parameter, κ value was calculated from the GF measurement values following Petters and Kreidenweis[3] through the relationship:

$$\kappa = \frac{GF^3 - 1}{RH/100} \exp\left[\frac{A}{D_o \cdot GF}\right] - \left(GF^3 - 1\right)$$

where GF is the growth factor, D_o is the wet particle diameter and A is calculated from:

$$A = \frac{4\sigma_s M_w}{RT\rho_w}$$

where σ_S is the surface tension of water (0.072 J/m^2), M_w is the molecular weight of water (0.018 kg/mol), and ρ_w is the density of water (1000 kg/m^3), R is the ideal gas constant, T is temperature (298 K).

C. REFERENCES

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3. M. D. Petters and S. M. Kreidenweis, *Atmos. Chem. Phys.*, 2007, **7**, 1961-1971.