Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Aerosol Particle Interfacial Thermodynamics and Phase Partitioning Measurements Using Biphasic Microfluidics CARI DUTCHER, ANDREW METCALF, University of Minnesota, Twin Cities — Secondary organic aerosol particles are nearly ubiquitous in the atmosphere and yet there remain large uncertainties in their formation processes and ambient properties. These particles are complex microenvironments, which can contain multiple interfaces due to internal aqueous–organic phase partitioning and to the external liquid–vapor surface. Interfacial properties affect the ambient aerosol morphology, or internal structure of the particle, which in turn can affect the way a particle interacts with an environment of condensable clusters and organic vapors. To improve our ability to accurately predict ambient aerosol morphology, we must improve our knowledge of aerosol interfaces and their interactions with the ambient environment. Unfortunately, many techniques employed to measure interfacial properties do so in bulk solutions or in the presence of a ternary (e.g. solid) phase. In this talk, a novel method using biphasic microscale flows will be introduced for generating, trapping, and perturbing complex interfaces at atmospherically relevant conditions. These microfluidic experiments utilize high-speed imaging to monitor interfacial phenomena at the microscale and are performed with phase contrast and fluorescence microscopy on a temperature-controlled inverted microscope stage. From these experiments, interfacial thermodynamic properties such as surface or interfacial tension, rheological properties such as interfacial moduli, and kinetic properties such as mass transfer coefficients can be measured or inferred.

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Date submitted: 14 Nov 2014 Electronic form version 1.4