Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Microfluidic Study of Temperature Dependent Phase Changes in Aqueous Aerosol Systems[1] PRIYATANU ROY, CARI DUTCHER, University of Minnesota — Atmospheric aerosols are suspensions of small liquid or solid particles suspended in air which play a major role in climate change, either directly by absorption and scattering of solar irradiation or indirectly by cloud formation. They are complex multiphase fluid systems and experience a broad range of relative humidities and subzero temperatures in the atmosphere affecting their phase state i.e. well-mixed liquid, phase separated or crystallized solid. In situ observation of relative humidity and temperature of aerosol droplets are difficult and expensive. In this work, low cost microfluidic devices are used to generate and study phase states of aqueous droplets of real aerosols and chemical mimics in static and flow-through devices at subzero temperatures. The static device dehydrates trapped droplets in quasi-equilibrium to study the effect of relative humidity and water loss on phase state at different temperatures. The high-throughput flow-through microfluidic device measures ice nucleation temperature of aerosols. The results will be used to predict the cloud and ice formation activity of atmospheric aerosols.

[1]NSF CAICE and UMN MNC

Priyatanu Roy
University of Minnesota

Date submitted: 26 Jul 2019 Electronic form version 1.4