

# The Structure of Atmospheric Particles & Impacts on Atmospheric Chemistry and Climate

**Miriam Freedman, Assistant Professor of Chemistry,  
The Pennsylvania State University**

## Abstract

The interactions of aerosol particles with light and clouds are the leading uncertainties in our understanding of the climate system. These interactions are determined in part by the structure of atmospheric particles. In this talk, I will give an overview of research in my laboratory that focuses on characterizing the structure of particles and how this structure impacts heterogeneous atmospheric chemistry and climate. In particular, the talk will focus on molecular-level studies of surfaces relevant for cirrus (ice) cloud formation and the phase separation behavior of submicron aerosol particles composed of organic and inorganic components. Global climate models are extremely sensitive to the formation and properties of cirrus clouds. While “active sites” are proposed to be important for ice nucleation, the identity of these sites is unknown. Using systems in which the ice nucleation behavior is altered by chemical processing, we can determine the identity of these active sites. In aerosol particles composed of organic and inorganic components, the arrangement of components within the particles affects the formation and growth of particles, their radiative properties, and heterogeneous chemistry. For certain compositions, we observe that the morphology of submicron particles is size dependent, where small particles (less than approximately 200 nm) are homogeneous and large particles are phase separated. I will comment on the possible origins of this size dependent behavior as well as potential impacts on aerosol radiative properties. Through these projects, I will demonstrate the importance of characterizing aerosol structure in determining aerosol physical and chemical properties relevant to atmospheric chemistry and climate.

**Tuesday, October 28**

**3:15 p.m. Refreshments**

**3:30 p.m. – Seminar**

**FL2-1022, Large Auditorium**