

Measuring single-particle absorption from elastic light scattering patterns of complex aggregates

Sequoyah Walters*, Jason Zallie, Gabriel Seymour, Daniel Landgraf,
and Kevin Aptowicz

West Chester University, 700 S. High St., West Chester, PA 19382, USA

**Presenting author (SW855527@wcupa.edu)*

It is well known that elastic light scattering of aerosol particles depends upon particle morphology. However, for nonspherical atmospheric aerosol particles, the relationship between particle morphology and atmospheric light scattering is incredibly complicated. In this work, we explore a possible method for charactering an individual particle's absorption by analyzing the two-dimensional angularly-resolved optical scattering (TAOS) pattern of the particle. In particular, for a complex aggregate, the scattering cross-section of a particle is strongly dependent on the overall size of the aggregate as well as the absorptive properties of the particle. By performing an auto-correlation analysis of the TAOS pattern, we can estimate the size of the aggregate independent of its absorption. In addition, we can measure, within the constraints of our experimental geometry, an approximate scattering cross-section. With these two quantities (i.e. the scattering cross-section and nominal particle size) we can roughly estimate the absorption of the particle. This approach was tested by simulating the scattering from a cluster of spheres using the T-matrix method. We will present the results of this simulation showing how the technique works as well as some preliminary analysis of TAOS patterns collected from actual atmospheric aerosols.

Preferred mode of presentation: Poster