Research Objective

- Develop a technology that measures Raman spectra of individual trapped particles from continuous sampling aerosol.
- Use it for detecting and characterizing bio and chem agent and atmospheric aerosol particles.

Challenges

- Raman spectra are extremely weak.
- Drag forces from air tend to make particles move.
- Trap particles in air are very difficult, especially from continuous sampling.
- Detect bio- & Chem-threat agents within the complex atmospheric aerosols are very difficult.

ARL Facilities and Capabilities Available to Support Collaborative Research

- 4 labs over 1200 square feet of research space.
- Continuous-wave and pulsed laser sources from deep UV to visible and near IR.
- Various spectrographs; image and spectral detectors; microscopes; aerosol trapping devices; and aerosol generators.
- Dual-wavelength single particle fluorescence spectrometer.
- Detection of single particle elastic scattering patterns.
- Single particle Raman spectroscopy of trapped aerosol particles in air.

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

Seek wide collaborations with universities, research institutes, and governmental agencies; Explore deep understanding of atmospheric aerosol, particular bio- & chem-aerosol particles.

(a) Shaped laser beam is able to trap both transparent and absorbing particles in air using low N.A. optics; (b) Single Johnson grass smut spore is trapped in air; (c) SEM images from B. Subtilis, Ragweed, Jognon grass smut spores, and Carbon nanotubes; (d) Raman spectra from pollens.