Title:	Bioaerosol Detection via Nanoparticle Surface Enhanced Raman Spectroscopy
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Description:	Conventional methods of sampling and analyzing bioaerosols do not presently provide rapid identification of potential bio-threats. Time-of-flight mass spectrometers have made possible the rapid detection of inorganic and some organic molecules, but these systems ablate the particles and the identification of the fragments would be especially difficult for bioaerosol particles. To detect small quantities of biomaterial against a high background of other commonly occurring atmospheric particles, any potential bio-detection system would require both high sensitivity (small quantities of material present) and the ability to separate the signal of interest from the background (much biomaterial is similar). Rapid identification requires that sampling and analysis occur in the same instrument. We propose to study the potential of surface enhanced resonance Raman Spectroscopy (SERRS) or surface enhanced Raman spectroscopy (SERS) as a method for detecting bioaerosol. We will use the recent advances in nanosurface deposition techniques to produce a surface onto which we can deposit sample bioaerosol and chemically analyze it using SERRS or SERS. From earlier work with pollen we find that, at the appropriate wavelengths, it is possible to distinguish pollen species using Raman spectroscopy. Since the need exists to detect very small quantities of any potential bio-threat, we will also investigate the use of UV laser radiation to excite resonance Raman scattered light. This, combined with the large enhancements possible using arrays of nanoparticles, should provide ample sensitivity for detecting signals from small quantities of biomaterial.