Novel Platforms for SERS-Based Sensing of Infectious Disease

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Development of diagnostic methods for rapid and sensitive identification of biomedical pathogens is essential for the advancement of therapeutic and intervention strategies necessary to protect public health. Current diagnostic methods, e.g. culture, isolation, PCR, antigen detection, and serology, are often time-consuming, cumbersome, or lack sensitivity. We have investigated several different nanoparticle platforms for surface-enhanced Raman (SERS)-based identification and classification of pathogens. These platforms included metal colloids, nanosphere arrays, OAD nanorod arrays, and layer-by-layer nanoparticle assembly. The current talk will address the development of spectroscopic methods for pathogen detection based on these nanostructured SERS platforms. Examples will include the use of click chemistry for building carbohydrate microarrays as well as the detection of *Mycoplasma pneumonia* in simulated and true clinical specimens. We will present multivariate statistical analyses that indicate it is possible to identify, differentiate and classify pathogens based on their intrinsic SERS spectra, even down to the individual strain level.