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Today's emerging nano technology based on molecular device and biological science demands appropriate tools for chemically investigating a specific part with nanometer scale spatial resolution in ambient condition. Electron microscopy fits very well in the spatial resolution aspect, but they hardly provide any *molecular* information and strictly require a high vacuum condition. Scanning Probe Microscopy, such as STM and AFM, also provides nanometer scale spatial resolution but only with very limited molecular information due to their inherent imaging mechanism: tunneling and force interaction between molecule and tip. Laser spectroscopic information in nanometer scale would be most desirable because of its inherent capability to give a wealth of information on the chemical bonding and functional groups. Since the diffraction limit does not allow us to focus light to dimensions smaller than roughly half a wavelength, traditionally it was not possible to interact selectively with nanoscale features.

In this talk, recent effort and development in molecular nano analysis in ambient condition to overcome the diffraction limit as well as current limitations of AFM by combining AFM with Raman spectroscopy will be presented.