Nano Spectroscopy for Molecular Optical Imaging

Yung Doug SUH

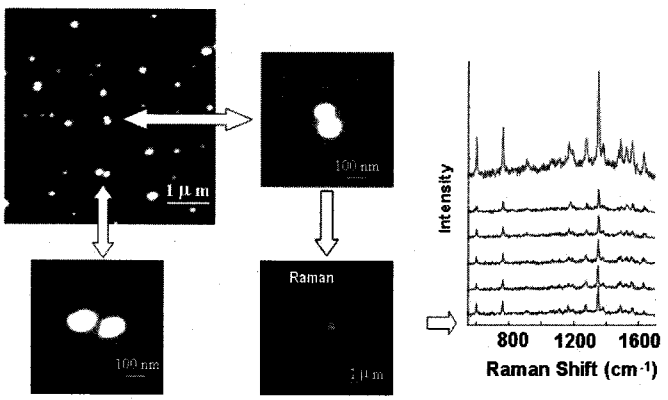
Fusion Biotechnology Research Center, Korea Research Institute of Chemical Technology

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 spectroscopy in ambient condition to overcome the diffraction limit as well as current limitations of AFM by combining AFM with Laser spectroscopy will be presented. Additionally, recent data probing single-wire reaction of Single-walled Carbon Nanotube (SWNT) will be presented.

Laboratory for Advanced Molecular Probing (LAMP)

Correlated AFM and Confocal Raman Microscopy

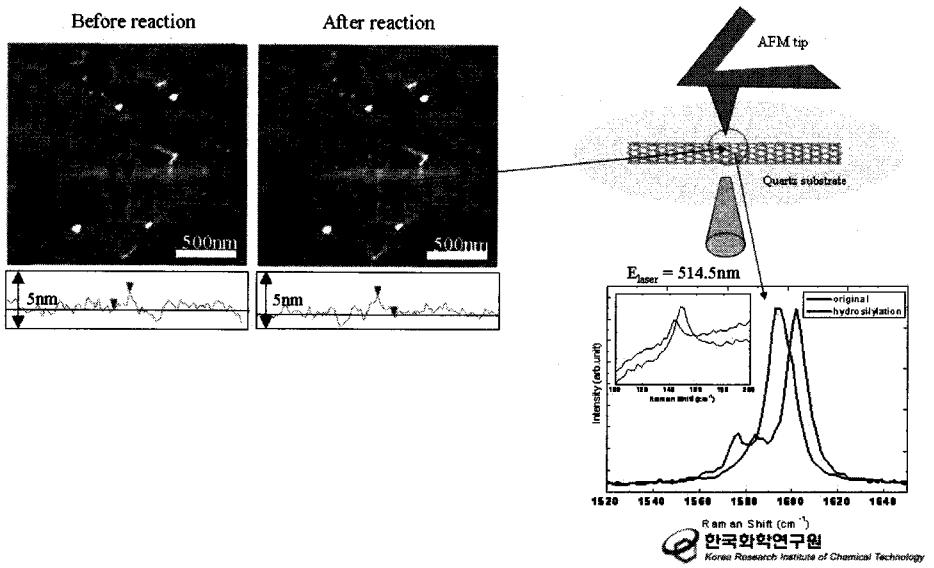


top left: AFM image (5x5 μm^2) of silver nanoparticles adsorbed with the Rhodamine 6G (R6G) molecules (~ 25 R6G per particle).
lower right: 2-D Raman intensity image (5x5 μm^2, the same area as in A) of the R6G molecules adsorbed on silver nanoparticles at 514.5-nm linear polarized excitation.

한국화학연구원
Korea Research Institute of Chemical Technology

Laboratory for Advanced Molecular Probing (LAMP)

Correlated AFM and Nano Raman



한국화학연구원
Korea Research Institute of Chemical Technology

Laboratory for Advanced Molecular Probing (LAMP)

극미세 분석의 향후 전망