

Near-field physics and chemistry: Studied by scanning tunneling microscopy for local optical excitation & detection

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Near-field optical excitation, particularly a strong field enhancement through surface plasmon excitation in a nanoscale cavity is applicable to ultrasensitive spectroscopy and to enhance chemical processes such as tip-enhanced Raman spectroscopy (TERS) and plasmonic catalysts. We recently investigate the fundamental mechanisms of near-field physics and chemistry by a low-temperature scanning tunneling microscope (STM) with capabilities of local optical excitation and detection. In the talk, I will show plasmon-assisted resonant electron transfer, nanoscale vibrational spectroscopy using TERS, and precise control of plasmon-mediated chemical reactions.