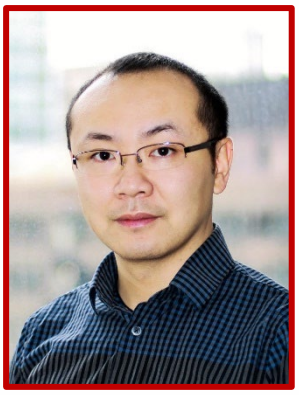
CHEMISTRY

# Fall 2021 CHEMISTRY COLLOQUIA



**December 3, 2021**

**3:15 – Sign-in**

**3:30 Seminar**
**112 Hamilton Hall**

## Professor Nan Jiang
### University of Illinois at Chicago

### Angstrom Scale Chemical Analysis via Scanning Tunneling Microscopy and Tip-Enhanced Raman Spectroscopy

My research group is broadly interested in spectroscopically determining how local chemical environments affect single-molecule behaviors. This talk will focus on Tip-Enhanced Raman Spectroscopy (TERS), which affords the spatial resolution of traditional Scanning Tunneling Microscopy (STM) while collecting the chemical information provided by Raman spectroscopy. By using a plasmonically-active material for our scanning probe, the Raman signal at the tip-sample junction is incredibly enhanced, allowing for single-molecule probing. This method, further aided by the benefits of ultrahigh vacuum, is uniquely capable of obtaining (1) single molecules chemical identification; (2) the molecular mechanism of chemical bond formation under near-surface conditions using self-assembly concepts; (3) adsorbate-substrate interactions in the ordering of molecular building blocks in supramolecular nanostructures (4) local strain effects in an organic/2D materials heterostructure. By investigating substrate structures, superstructures, 2D materials lattices, and the adsorption orientations obtained from vibrational modes, we extract novel surface-chemistry information at an unprecedented spatial (<1nm) and energy (<10 wavenumber) resolution. We are able to interrogate the impact of changes in the chemical environment on the properties of nanostructures, and thereby demonstrate what is possible to date in terms of benchtop angstrom-scale investigation of nanoscale functional systems on the very basic level.

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