

# The 305<sup>th</sup> MANA Special Seminar



## Imaging and manipulating molecular quantum states in an STM tunnel junction

Chair: Dr. Tomonobu Nakayama (MANA PI)

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A scanning tunneling microscope (STM) differential conductance ( $dI/dV$ ) measurement is a very effective technique to gain access to the low lying electronic states of single molecules. To have access to those states, a molecule has to be electronically decoupled or weakly coupled, i.e. physisorbed, to the metal surface. I present here how the electron probability distributions of molecular states are imaged in real space using pentacene, Cu-phthalocyanine, and hexabenzocoronene molecules directly adsorbed on a gold surface. STM  $dI/dV$  conductance images taken at voltages corresponding to the resonances near the substrate Fermi level were found to be very close to the mono-electronic molecular orbitals (MO), in contrast high-order resonance states images were composed of MO components from many states even though those states lie in a lower energy range. Based on this technique, I also show that is possible to manipulate the molecular quantum states by using classical metal atom contacts as inputs demonstrating that custom synthesized molecules can function as Boolean logic gates or analogue counters.

**Venue: Auditorium, 1F, WPI - MANA Bldg.**

**Namiki site**

**Date: December 27<sup>th</sup>, Thursday      Time: 15:30-16:15**

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