

Making vibration patterns of single molecules visible

Researchers around Prof. Yousoo Kim from the Surface & Interface Science Laboratory at RIKEN in Japan use tip enhanced Raman spectroscopy (TERS) or more specifically scanning tunnelling microscopy TERS to investigate single molecules on very thin insulating films. The team shows in a recent study that the resolution of their setup is so high that they are able to resolve the shape of individual vibrational modes with submolecular resolution. The researchers think that their experimental approach will be useful for the discovery of new materials and their properties.

The researchers are observing single copper naphthalocyanine (CuNc) molecules on Ag crystals. The molecules are placed on an ultrathin, triple-layer insulating NaCl to prevent them from interacting with the Ag surface, so the intrinsic properties of the CuNc molecules can be observed.

For TERS an atomically fine tip is brought in very close contact to the molecule. Strong electric field enhancement due to the tip leads to a magnification of the Raman signal of the molecule. TERS measurements are extremely challenging, in particular on the single molecule level, due to the inherently weak Raman signals and very sharp Raman peaks. For achieving high signal to noise the experiment setup uses an Isoplan 320 system and PIXIS camera.

Featured Paper/Publication: [Single-molecule resonance Raman effect in a plasmonic nanocavity](#)

Reference Lab: Yousoo Kim, Riken, Japan

Featured Product: [Isoplan](#), [PIXIS](#)