The Thermosalient Phenomenon. “Jumping Crystals” and Crystal Chemistry of the Anticholinergic Agent Bromide

Shu, Œ, Zanir, S., Naumon, P.; Bernstein, J. (Graduate School of Engineering)

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The thermosalient effect, colloquially also referred to as “jumping crystals”, is an extremely rarely observed, albeit very important phenomenon. When heated or cooled, crystals of some materials can jump about several centimeters high as a result of the colossal mechanical strain that develops in their structures. Although this property is very prospective for fabrication of actuators for conversion of heat into mechanical work, its mechanism has remained unexplained. In this work, we found that each jumping molecule can be regarded as “molecular shuttle”, where two rigid fragments are connected by a flexible linker that acts as mechanical spring. When the mechanical stress is relieved, the crystals can jump (highlighted in *Nature Chemistry*, 2:1003 (2010); *Crystal Growth & Design*, https://communities.acs.org/doc/DOC-3662).

Photoswitching Triadop Single Molecular Tip for Noncontact AFM Measurements: Synthesis, Immobilization, and Reversible Configurational Change on Gold Surface

Takamatsu, D.; Fukui, K.; Arooa S.; Yamashita, S. (Graduate School of Engineering Science)

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Triadop molecules consisting of a tetrastabilized adamantane with three phenylacetylene legs and a reversibly photoswitching apex were designed as “single molecular tips” for both chemical and topographical characterization of the substrate surface. By covalent attachment onto gold-coated tips of atomic force microscopy (AFM), through three S–Au bonds, these rigid triadop molecules are expected to act as sharp, robust, and stationary molecular tips whose configuration can be reversibly changed upon irradiation with UV or visible light. In this report, the full account of the synthesis of two photoswitching triadop molecular tips, their immobilization onto Au(111) surfaces, and the detection of photoinduced configurational change on Au(111) surface by scanning probe microscopy (SPM) measurements are documented.

Single Molecule Identification via Electric Current Noise

Tsutsui, M.; Taniguchi, M.; Kawai, T. (The Institute of Scientific and Industrial Research)


We find that inelastic noise in a single-molecule tunneling junction increases in a stepwise fashion synchronous to the onset of inelastic excitations of its distinct vibrational modes active in the electron-phonon interaction, which thereby enable single-molecule fingerprinting through examining the noise spectra. We are also able to identify the electron-phonon coupling strength and the symmetry of a single organic molecule from the distinct noise characteristics. As electron-vibration interactions exist in virtually any types of molecules, these findings suggest a potential use of inelastic noise as a useful molecular signature for single-molecule identifications with high specificity that may open new venues for practical realization of single-molecule sensors.

Gapless Spin Liquid of an Organic Triangular Compound Evidence by Thermodynamic Measurements

Yamashita, S., Yamamoto, T.; Nakazato, Y.; Tamura, M.; Kato, R. (Graduate School of Science)

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We investigated thermodynamic properties of an anion radical spin-liquid compound of EtMe3Sb[Pd(dmit)2]2, where dmit represents 1,3-dithiole-2-thione-4,5-dithiolate. This compound is an organic dimer based Mott insulator with a two-dimensional triangular lattice structure of $\frac{S-1}{2}$. We observed a distinct evidence for the formation of gapless spin-liquid by measuring $C_{v}$ under magnetic fields up to 8 T. Through comparative analyses with $x$-(BEDT-TTF)$_{2}$Cu$_2$(CN)$_{x}$, using the Wilson ratio, the electronic heat capacity coefficient was found to be in proportion to the magnetic susceptibility, as in the case of Fermi liquid systems. Furthermore, anomalous enhancement of...