Visiting Professors

Visiting Professor
FUKAZAWA, Aiko *(from Kyoto University)*

Renaissance of Nonbenzenoid π-Conjugated Systems toward Functional Materials

The work of our group has focused on exploring functional organic compounds with unusual with superb optical and/or electronic properties, based on the molecular designs of novel π-conjugated scaffolds as well as unusual functional groups. In particular, we have recently proposed a rational design of stable yet unusual π-conjugated systems based on the characteristics of nonbenzenoid hydrocarbons, *i.e.*, dehydroannulenes, non-alternant hydrocarbons, and fulvalenes, by the fusion of (hetero)arenes with small magnitude of aromaticity. In this year, we have succeeded in synthesizing several thiophene-fused antiaromatic π-systems, such as dithieno[*a*,*e*]pentalenes and their nitrogen-doped analogues. These thiophene-fused antiaromatics exhibit high thermal stability even without bearing bulky substituents while retaining pronounced antiaromatic character. These features give rise to characteristic long-wavelength absorption as well as aggregation behavior of these compounds.

Visiting Professor
WATANABE, Rikiya *(from RIKEN)*

Single Molecule Physiology

Our study aims to understand cellular functions using a bottom-up approach from the single molecule level. To achieve this, we are attempting to elucidate the mechanism by which individual biomolecules or their networks function in a precise manner, by developing novel single-molecule techniques using multidisciplinary approaches, including biophysics, bioMEMS, and chemical biology. In addition, we are developing a methodology to investigate correlations between genetic mutations, dysfunctions, and diseases with single molecule sensitivity, which would provide new insights for biological as well as pharmaceutical studies.

Visiting Associate Professor
UEDA, Akira *(from Kumamoto University)*

Development of Purely Organic Molecular Materials with Unique Structural/Electronic Properties

Design and synthesis of novel molecular materials have been a central issue for the development of molecular science. Our group has continuously focused on purely organic molecular materials with unique crystal/electronic structures and physical properties. Very recently, we have succeeded in the development of a novel neutral radical molecular conductor with a partially charge-transferred structure. Interestingly, this material forms a two-dimensional conducting layer like BEDT-TTF salts, resulting in a much higher electrical conductivity than that of the conventional neutral radical conductors. These results suggest that this material is a possible candidate of a purely organic single-component molecular metal or superconductor. The magnetic properties and phase transition behavior of this material are of interest and thus will be investigated in the near future.