Visiting Professors

Visiting Professor
ASAKURA, Tetsuo *(from Tokyo University of Agriculture and Technology)*

Determination of Molecular Structure with Ultra Fast MAS under High-Field NMR

In single crystal X-ray diffraction analyses of peptides and proteins, it is well-known that the co-ordinates of carbon, nitrogen and oxygen atoms can be obtained in high accuracy, but enough accuracy cannot be obtained for those of hydrogen. Therefore we are trying to determine the accurate ^{1}H positions by the combination of NMR observation by ultra fast magic angle spinning under high field magnetic field and accurate ^{1}H NMR chemical shift calculation. We are applying this novel analytical technique to determine the structures of silk fibroins before and after spinning together with their model peptides. Since such a ^{1}H information is sensitive to both the intra- and inter -molecular structures, it is especially useful in molecular design of biomaterials with silks.

Visiting Professor
TAKENOBU, Taishi *(from Waseda University)*

Electronic Phase Control of Molecular Materials by Electric Double Layer Transistors

Charge carrier control is one of the key issues in the development of solid state physics and novel functional devices. Beyond the simple enhancement of conductivity, high charge carrier accumulation can realize various phenomena, such as phase transition, magnetic ordering, and superconductivity. Electric double layers, formed at solid/electrolyte interfaces, induce extremely large electric fields, huge specific capacitance and high charge carrier accumulation, and, as the results, this method opens new route for novel functionalities. Because molecular materials have large variety of electronic and magnetic properties, we are trying the combination of molecular solid and electric double layer transistors to discover novel phase transitions and functional devices.

Visiting Associate Professor
KANEMOTO, Katsuichi *(from Osaka City University)*

Optical and ESR Characterizations of Organic Semiconductor Devices

π-conjugated molecules and polymers have been the subject of much interest due to their potential device applications such as LEDs, solar cells, and field-effect transistors. Their remarkable electronic properties are owing to excitons and carriers created by photoexcitation or bias impression. The main purpose of our research is to characterize the determinant roles of the excitons and carriers on the device operation, through *in situ* optical and ESR measurements for operating organic devices. Recently, we found that a transient current is induced at the moment of ESR in polymer diodes under photoirradiation. The transient current was compatible with a steady-state photocurrent and found to arise from a change of polarization induced by ESR.