

# Visiting Professors



Visiting Professor  
**KITAJIMA, Masahiro** (*from National Institute for Materials Science*)

### Electron-Phonon Interaction Dynamics and Optical Control of the Coherent Optical Phonons

We are studying on coherent phonons in metals and semiconductors, using fs pump-probe techniques. Our main interest is to know how excited carriers are coupled with the phonons coherently. We have recently started investigating optical control of coherent phonons in semimetals by using a pair of fs laser pulses whose relative timing is tuned on the attosecond time scale. This new challenge is being collaborated with the Prof. Ohmori's group of IMS, and would serve as a powerful tool for understanding the fundamental mechanism of the interaction between a photo-excited single particle and the constituents of the surrounding lattice.



Visiting Associate Professor  
**BABA, Masaaki** (*from Kyoto University*)

### Excited-State Structure and Dynamics of Isolated Molecules

Excited-state dynamics such as internal conversion (IC) to the ground state, intersystem crossing (ISC) to the triplet state, intramolecular vibrational redistribution (IVR), and predissociation are of great interest because these radiationless transitions are closely related to the energy level scheme and break down of Born-Oppenheimer or adiabatic approximation. Rotationally resolved ultrahigh-resolution laser spectroscopy is powerful to investigate not only the accurate level energies, but also the lifetime, magnetic moment, and coherence of the isolated molecules in a supersonic jet. These properties are very important to understand the origin of dynamical processes in the electronic excited state.



Visiting Professor  
**SODA, Kazuo** (*from Nagoya University*)

### Electronic Structure of Bulk Metallic Glasses and Heusler-Type Alloys

The electronic structures and their correlation with functional properties of bulk metallic glasses and Heusler-type Fe-based alloys have been investigated by means of photoelectron spectroscopy and photoabsorption spectroscopy with use of synchrotron radiation as a light source in order to clarify the origins of their fascinating functional properties. Bulk metallic glasses is bulky multi-component amorphous alloys, possessing useful engineering properties in spite of their thermodynamically metastable phase, while Heusler-type Fe-based alloys are promising thermoelectric materials, showing high mechanical strength and larger power factor than a conventional Bi-Te semiconductors.



Visiting Associate Professor  
**OKADA, Kazumasa** (*from Hiroshima University*)

### Study on the Fragmentation of Molecules and Clusters in the Inner-Valence and Inner-Shell Electron Excitation Regions

The knowledge of the mechanisms involved in the ionization helps us to understand various processes in which there exists interaction of molecules and photons or electrons. The fragmentation dynamics of highly-excited or multiply-ionized molecules and clusters is studied by means of time-of-flight mass spectrometry. Multiple modes of measurement are used to obtain branching ratios of fragment ions or breakdown diagrams. Kinetic energy distribution of fragments provides insight into the nature of the fragmentation process.