

エクストリームフォトニクスセミナー *Extreme Photonics Seminar*

Language: Japanese

Date : July 27(Fri), 2012, 15:00 ~ 17:00

Location : Cooperation Center, 4F Meeting Room, W426
(研究交流棟 4 階会議室 W426)

Title : Nonlinear interactions of intense terahertz pulses
with condensed matters

Speaker : Dr. Hideki Hirori
(Institute for Integrated Cell-Material Sciences, Kyoto University)

The recent developments of intense terahertz (THz) pulse generation has allowed us to study the unexplored nonlinear phenomena such as coherent manipulation of quantum states, high-order harmonic generation, nonlinear optical processes, and nonlinear transport phenomena in solids. In this talk, I would like to present our recent development of intense single-cycle THz pulse generation by optical rectification of femtosecond laser pulse in LiNbO₃ using the tilted-pump-pulse-front scheme, and nonlinear interactions of semiconducting multiple quantum wells with the intense THz pulses.

Title : Practical applications of nonlinear spectroscopy
using femtosecond phase-programmed pulses

Speaker : Prof. Kazuhiko Misawa
(Tokyo University of Agriculture and Technology)

We demonstrate heterodyne-detected coherent Raman microspectroscopy and broadband tunable THz polarimetry using femtosecond phase-programmed pulses. We discuss requirements for practical applications of nonlinear spectroscopy using femtosecond phase-programmed pulses.

The present talk is made up of two subjects, *in vivo* molecular labeling of anesthetic molecules and broadband tunable generation of arbitrary polarized THz radiation.

Halogenated anesthetic molecules were visualized using molecular labeling by CARS spectra in a giant squid axon. Vibrational spectra associated with the halogen atoms and ether structure in the anesthetic drugs were identified by a single-beam measurement using phase-modulated broadband pulses.

Arbitrary polarization states were generated by optical rectification of polarization twisted pulses. The polarization twisted pulses have a continuously rotating linear polarization over the pulse envelope, and the rotating polarization envelope was converted into circularly polarized light in the THz range.