

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

No. 3

Language: Japanese

Date: June 28th(Mon), 2010, 10:00 ~ 12:00

Location: Cooperation Center, 5F Meeting Room, W524

Title: Ultrafast dynamics of laser-matter interaction studied with femtosecond-laser-based ultrashort soft x-ray pulse sources

Speaker: Dr. Katsuya Oguri (NTT Basic Research Laboratories)

A new field of 'ultrafast x-ray science' is rapidly emerging with recent advances in the generation of ultrashort pulses in the region from extreme ultraviolet to x-ray using a variety of technologies including: ultrafast laser-based x-ray sources, x-ray free electron laser, and synchrotron-based ultrashort x-ray sources. This research field is expected to reveal dynamical properties on the time scale of picosecond, femtosecond, and even attosecond in a variety of matter system. In this talk, I will present the applications of femtosecond-laser-based ultrashort soft x-ray pulse sources in the region of 100 eV to ultrafast phase transformation dynamics induced by laser-matter interaction. The key technique is time-resolved soft x-ray absorption spectroscopy using two types of ultrashort soft x-ray source; femtosecond laser-produced plasma soft x-ray and high-order harmonics. I will mainly introduce the dynamic imaging of femtosecond-laser ablation plume of metal and discuss the possible mechanism of nanoparticle generation via the ablation process. I also discuss the unique capability of the technique for investigating structural and electronic dynamics by reviewing our recent research activities.

Title: Carrier envelope phase stabilized few-cycle pulse generation and its application to attosecond molecular science

Speaker: Dr. Tomoya Okino (Univ. Tokyo)

We reported recently that ultrafast hydrogen migration is induced when hydrocarbon molecules are exposed to an intense laser field. For clarifying how fast the migration proceeds within the ultrashort laser pulse, it would be necessary to make laser pulses as short as possible. Recently, we generated few-cycle laser pulses for real-time probing of the ultrafast hydrogen migration process, and investigate its dependence on the carrier envelope phase (CEP). The CEP of a high-repetition, high-power femtosecond laser system (5 kHz, 6 mJ, 35 fs) composed of a grating-stretcher/compressor is stabilized within 200 mrad for several hours by reducing the acoustic and mechanical vibrations, and then, intense few-cycle pulses (5 fs, 2 mJ) are generated by introducing the CEP-locked pulses into a differentially-pumped hollow-fiber compressor filled with a neon gas. The CEP-locked few-cycle pulses will afford us to generate single attosecond pulses for investigating the ultrafast hydrogen with attosecond temporal resolution.