

# エクストリームフォトンクスセミナー

## *Extreme Photonics Seminar*



日時: 平成20年10月23日(木)  
16:00 ~ 18:00, Oct. 23 (Thu.), 2008

場所: 研究交流棟5階会議室 W524  
Cooperation Center, 5F Meeting Room, W524

題目: 軟X線レーザー照射によるキセノンクラスターの内殻電離過程  
*Innershell Ionization Process in Xenon Clusters Irradiated with a Soft X-Ray Laser Pulse*

講師: 難波 慎一 氏 (広島大学大学院工学研究科 助教)  
Dr. Shinichi NAMBA, Research Associate, Hiroshima University

要旨: The interaction of large Xe clusters with a soft x-ray laser pulse having a wavelength of 13.9 nm and an intensity of up to  $2 \times 10^{10}$  W/cm<sup>2</sup> was investigated using a time-of-flight ion mass spectrometer. The corresponding laser photon energy ( $h\nu=89.2$  eV) was sufficiently high to photoionize Xe 4d inner-shell electrons (threshold energies: 67.55 eV for  $4d_{5/2}$  and 69.54 eV for  $4d_{3/2}$ ). It was found that Xe<sup>3+</sup> ions (which result from double Auger decay of 4d vacancies) became the dominant final ionic product with increasing cluster size and x-ray intensity. This is in contrast to the results of synchrotron radiation experiments involving free Xe atoms, in which Xe<sup>2+</sup> is the dominant resultant ion species. Possible mechanisms responsible for the enhancement of the double Auger transition probability in x-ray laser and cluster interaction are discussed.

題目: 軟X線顕微鏡における多層膜イメージング光学に関する研究  
*Multilayer imaging optics for soft-X-ray microscopy*

講師: 豊田 光紀 氏 (東北大学多元物質科学研究所 助教)  
Dr. Mitsunori TOYODA, Research Associate, Tohoku University

要旨: High-resolution and element-specificity of soft X-ray on imaging applications have been proved by historical zone-plate microscopes with natural biological specimens and nanometer structures of various materials. However, the zone plate manufacturing accuracy limits the diameter far below one mm, which requires a narrow beam of synchrotron radiation available at limited locations and machine-time. Alternatively, Schwarzschild microscopes configuring a two-mirror objective free from aberrations can be made with soft-X-ray multilayer mirrors of a few to several cm in diameter, which allows to use a laboratory light source. In this seminar, a multilayer imaging optics for soft-X-ray microscopy will be introduced. Here the author presents an optical designing and an implementation of a state-of-the-art multilayer optics, which has a numerical aperture of 0.25 and a spatial resolution higher than 30 nm. Application of the multilayer optics to focus coherent X-ray sources, i.e. a free electron laser and a higher harmonic generation, are also discussed.

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