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

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15:00 ～ 17:00, December 1st(Tue), 2009

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

題目: **ホログラフィックフェムト秒レーザー加工**
"Holographic femtosecond laser processing"

講師: 早﨑　芳夫　　氏　（宇都宮大学 オプティクス教育研究センター）
Prof. Yoshio HAYASAKI (Utsunomiya Univ. Center for Optical Research & Education)

要旨: Femtosecond laser processing inside transparent materials has advantages of high spatial resolution due to multi-photon absorption and reduced thermal destruction of the target due to the extremely short pulse duration. Therefore, the femtosecond laser processing has been used to develop three-dimensional optical devices. To fabricate the three-dimensional optical devices composed of a huge number of processing points, parallel femtosecond laser processing with high throughput is indispensable.

Holography gives features of high throughput, high light use efficiency, and material-dependent light distribution to the femtosecond laser processing. Especially, computer-generated holograms (CGHs) are very useful and powerful tool, because the CGH can generate a desired arbitrary beam, such as a spatially-shaped beam, a split beam, a focused beam, and a wave-front corrected beam, with low loss of light. The CGH is variably displayed on a liquid-crystal spatial light modulator (LCSLM). A key requirement in a design of the CGH is a precise control of the diffraction peak intensity. Some methods for the control have been applied.

In my presentation, recent progresses in our study of holographic femtosecond laser processing, including two- and three-dimensional parallel processing, line processing, and adaptive optimizations of hologram for higher uniform processing are demonstrated.

題目: **レーザーで迫るソフトマテリアルの化学**
"Laser Chemistry of Soft Materials"

講師: 坪井　泰　　氏　（北海道大学 大学院理学研究院 ）
Prof. Yasuyuki TSUBOI (Division of Chemistry, School of Science, Hokkaido Univ.)

要旨: Organic materials such as liquid crystals, gels, artificial polymers, amino acids, proteins, and other bio-related materials are recently categorized as "soft materials", which are now intriguing research targets in various fields. In my presentation, we would like to demonstrate that laser is a powerful tool to explore chemistry and physics of soft materials such as biopolymers and stimuli-responsive artificial polymers. We present three topics. (I) Laser processing of soft materials: LIFT of a luminescent enzyme toward a development of an ATP sensor chip and laser nanohole processing on a polymer film beyond the diffraction limit. (II) Laser control of thermo-responsive polymers: phase transition and phase separation induced by photon pressure of a focused laser beam. Moreover, we will show you optical trapping of amino acids and proteins, (III) Laser measurement for thermo-responsive polymers: Dynamics of phase transition and phase separation of the polymers as revealed by a laser T-jump technique. Laser light would be an intriguing and novel stimulus to soft materials, as demonstrated in our recent publication.

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