

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

No. 8

Language: Japanese

Date : Nov.30(Fri), 2012, 15:00 ~ 17:00

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

Title : High-speed spectral imaging of tissues
by stimulated Raman microscopy

Speaker : 小関 泰之 氏 (大阪大学大学院工学研究科, JSTさきがけ)
Dr. Yasuyuki Ozeki (Osaka Univ., JST-PRESTO)

To date, medical imaging of tissues has largely relied on time-consuming staining processes and there is a need for rapid, label-free imaging techniques. Stimulated Raman scattering (SRS) microscopy offers 3D, real-time imaging capability with chemical specificity. However, it can be difficult to differentiate between several constituents in tissues because their spectral characteristics can overlap. In this presentation, I'll introduce our recent development of high-speed SRS spectral microscope (Nature Photon., advanced online). This system employs synchronized two-color laser pulses generated by a picosecond Ti:sapphire laser oscillator and a broadband Yb fiber oscillator equipped with a high-speed tunable optical bandpass filter. By using these pulses, we are able to acquire SRS images at a frame rate of >30 frames/s while the Raman shift can be tuned over >300 cm^{-1} in a frame-by-frame manner. Furthermore, the spectral images can be processed by independent component analysis to produce multicolor images showing different constituents. This system will be especially useful for quick, medical imaging of tissues.

Title : Basics and medical applications
of hollow optical fibers

Speaker : 松浦 祐司 氏 (東北大学大学院医工学研究科)
Prof. Yuji Matsuura (Tohoku Univ.)

Hollow optical fibers are useful for delivery of high-powered lasers for medical laser surgery owing to the power capability and flexibility. In addition, the fibers enable diagnostic spectral measurements using broadband light sources because there is no absorption loss in the hollow core at any wavelengths from ultraviolet to terahertz regions. In this talk, firstly, the structure, light-guiding mechanism, and fabrication method of hollow optical fibers are briefly explained. Then medical applications of hollow optical fibers including endoscopic laser surgery and infrared / Raman spectroscopy for optical biopsy are introduced. Also some latest results on measurement of blood glucose levels measured by the fiber probe and infrared imaging using bundled hollow fibers are reported.