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

No. 10

Language: ***Japanese***

Date : Dec. 20(Thu), 2012, 15:00 ～ 17:00

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

Title : Optical nonlinear control at a low power using optical microcavity

Speaker : 田邉　孝純　氏 (慶應義塾大学理工学部)
Assoc. Prof. Takasumi Tanabe (Fac.Sci.Tech., Keio Univ.)

A strong confinement of light by a high-Q microcavity enables efficient interaction between light and matter. In a high Q/V cavity, where V is the mode volume, optical nonlinearities such as two photon absorption and optical Kerr effect occur even at a low input power. It enables us to use this device as optical switches, optical bistable memories and nonlinear photo detectors.

In my talk I will briefly review our study on all-optical switching, optical bistable memory, and pin diode operation demonstrated in a photonic crystal nanocavity. We enabled efficient generation of two-photon absorption carriers in silicon at microwatt input power by using an ultrahigh Q nanocavity. I also discuss our recent studies on Kerr optical nonlinearity in a silica toroid microcavity system.

Title : Topological light pulse generation in few-cycle regime and its applications

Speaker : 森田　隆二　氏 (北海道大学大学院工学研究院)
Prof. Ryuji Morita (Dept. of Appl. Phys., Hokkaido Univ.)

Topological light waves, possessing a singularity (topological defect) in their beam center, have attracted much attention because of their increasing applications, such as laser trapping, laser tweezers, super-resolution microscopy, and quantum information using multidimensional entangled states. Unique properties of topological light waves caused by their space-dependent phase or polarization are used in the applications.

We demonstrated generation of a 2.3-cycle, 5.9-fs, 56-mJ ultrashort optical-vortex pulse (ranging from ~650 to ~950 nm) in few-cycle regime, as one of topological light waves, by optical parametric amplification. To the best of our knowledge, it is the first generation of topological light pulses in few-cycle regime. They can be powerful tools for ultra-broadband and/or ultrafast spectroscopy. Other experimental demonstrations using topological light pulses are also discussed.

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