エクストリームフォトニクスセミナー

Extreme Photonics Seminar

No. 7

Language: English

Date: September 30(Fri), 2011, 15:00 〜 17:00

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

Title: Broadband near-field spectroscopy and imaging

Speaker: Dr. Kentaro Furusawa (Nanophotonics Lab., RIKEN)

Recent progress on the nonlinear near-field spectroscopy and microscopy is reviewed in this talk. By employing a broadband z-polarization illumination scheme, efficient excitation of the tip-enhanced fields is accomplished and both linear and nonlinear responses of the Au-coated glass fiber tip are characterized by using it. Our results highlight that the effective bandwidth of the tip can be maintained by taking advantage of the inhomogeneity of the tip. This leads to a short pulsed excitation in the near-fields and enables Fourier-transform CARS spectroscopy in the near field despite the complex temporal dynamics inherent to the metallic tip.

Title: Three-dimensional photonic structures

Speaker: Dr. Kanna Aoki (Metamaterials Lab., RIKEN)

The speaker introduces fabrication technologies for three-dimensional micro-and nano-scale optical elements which would contribute to deliver emerging optical components such as photonic crystals and metamaterials.

Fabrication of microscopic objects is normally carried out without being able to see the process, and we can see the outcome after all fabrication steps were over. A technology, which enables us to handle micro-components with watching the process in real time, will allow us to explore microscopic world deeper than ever. In this talk, the speaker introduces a micromanipulation system for visually monitored assembly of components in micro- to nano-meter scale, which was established through the development of 3D photonic crystals.

Precision assembly and mass production of micro- and nano-scale components are often incompatible targets. The speaker is developing a magnetic assembly method to solve the problem. If a magnetic field were applied to a mixture of ferrofluid, paramagnetic beads, and diamagnetic particles, paramagnetic beads instantly align in the direction of magnetic field, and diamagnetic particles gather around an equator of a paramagnetic bead to form a Saturn-like ring in a normal plane to the direction of external magnetic field. Assembled Saturn-like rings possess predesignated numbers of plasmonic hot spots in a structure. Numbers of identical plasmon enhancing ring structures are assembled instantly throughout areas where the external magnetic field was applied, thus this approach is beneficial for mass production of plasmon enhancing unit components.

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