

Room A (101)

Session Title 26A1 / [T01] High-Power Solid-State Lasers
Date & Time Wednesday, 26 August, 09:00 ~ 10:30
Session Chair Thomas Südmeyer (University of Neuchatel, Switzerland)

[26A1-1] 09:00~09:30 Invited Talk

Development of an Ultrafast Thin-Disk Ring Oscillator with an Intra-Cavity Average Power Higher than 1 kW

A. Amani Eilanol¹, Yasuo Nabekawa¹, Makoto Kuwata-Gonokam², and Katsumi Midorikawa^{1,2}

¹RIKEN Center for Advanced Photonics, Japan, ²The University of Tokyo, Japan

We report intra-cavity average power upscaling of a Kerr lens mode-locked ring oscillator to 1060 W. Obtained pulse energy of 68 μ J is the highest inside a ring-type oscillator, to the best of our knowledge.

[26A1-2] 09:30~09:45

Dual-Wavelength Operation of a Diode-Pumped Yb:KGW Laser

R. Akbari, H. Zhao, and A. Major
University of Manitoba, Canada

A high power continuous-wave dual-wavelength Yb:KGW laser using a birefringent plate was demonstrated. Stable operation at 1014.6 nm and 1046.3 nm with 3.4 W of average output power was obtained with diffraction-limited beam profile.

[26A1-3] 09:45~10:00

Yb:YAG Thin-Disk CPA Laser System for Intense THz Pulse Generation at 1 kHz Repetition Rate

Y. Ochi, K. Nagashima, M. Maruyama, M. Tsubouchi, F. Yoshida, N. Kono, and A. Sugiyama
Japan Atomic Energy Agency, Japan

We have developed a high average power picosecond laser system dedicated to intense terahertz (THz) pulse generation. The system is a chirped pulse amplification laser equipping with a Yb:YAG thin-disk amplifier. The Yb:YAG thin-disk regenerative amplifier at room temperature provides pulses with energy over 10 mJ and spectral bandwidth of 1.2 nm at a repetition rate of 1 kHz. In a pulse compressor, the laser pulse is compressed to be 1.3 ps. By employing this picosecond pulse as a pump source, THz pulses at the center frequency of 0.3 THz with energy over a few microjoules have been generated at 1 kHz repetition rate by the optical rectification in Mg-LiNbO₃ crystal.

[26A1-4] 10:00~10:15

Monoclinic 20at.% Tb³⁺-Doped β -BaLu₂F₈ Single Crystals: Growth and Efficient Green Laser Operation

Philip Werner Metz, Daniel-Timo Marzahl, Ahmad Majid, and Christian Kränkel
Universität Hamburg, Germany

We report on the Czochralski growth of monoclinic β -BaLu₂F₈ single crystals. The solid-state phase transition was quenched by substituting 20% of the Lu³⁺-ions with Tb³⁺. An efficient green emitting Tb³⁺:BaLu₂F₈-laser could be demonstrated as well.

[26A1-5] 10:15~10:30

High Average Power Picosecond Sapphire Face-Cooled Nd:YVO₄ Bounce Laser System

Maya Kowa¹, Masashi Abe¹, Katsuhiko Miyamoto¹, and Takashige Omatsu^{1,2}

¹Chiba University, Japan, ²CREST Japan Science and Technology Agency, Japan

We developed a high average power, diffraction-limited (M²~1.1) picosecond laser system formed of a sapphire face-cooled Nd:YVO₄ slab amplifier with a multi-pass geometry. Average output power of 46.4 W was obtained at an optical-optical efficiency of 56%.

Room B (102)

Session Title 26B1 / [T06] Laser Processing for Flexible Electronics
Date & Time Wednesday, 26 August, 09:00 ~ 10:30
Session Chairs Sang Hoon Ahn (KIMM, Korea)
Jiyeon Choi (KIMM, Korea)

[26B1-1] 09:00~09:30 Invited Talk

Low Temperature Laser Processing for the Application in Flexible & Stretchable Electronics

Habeom Lee, Sukjoon Hong, Young Duk Suh, and Seung Hwan Ko
Seoul National University, Korea

Nanomaterials show various interesting unique thermal characteristics such as size dependent melting temperature drop, which can be used to develop plastic compatible low temperature metal patterning process. Focused laser as a local heat source can further reduce the processing temperature or induced localized thermochemical reaction. In this talk, recent research development and trend in nanomaterial based low temperature laser thermal engineering as well as applications will be discussed.

[26B1-2] 09:30~10:00 Invited Talk

Novel Process for Nano-structuring of Conducting Polymer Thin Film

Sang Min Chae¹, See Woo Lee¹, Kuk Hyun Jo¹, Ji Yeon Cho², Hyun Hwi Lee², and Hyo Jung Kim¹

¹Pusan National University, Korea, ²KIMM, Korea, ³POSTECH, Korea

We present new technique for nano-structuring of conducting polymers using femto-second (fs) laser in P3HT:PCBM films with special chain alignment. In an optimized condition of fs laser (1030 nm) irradiation on P3HT:PCBM films, the surface changed into a photoexpanded structure. The crystalline order of edge-on P3HT decreased, while the crystalline order of face-on P3HT increased in the photoexpanded area. The chain alignment of face-on P3HT was affected by the polarization direction of irradiated laser. The PCBM amount also increased in the photoexpanded area in comparison with the pristine area. The results of micro RAMAN measurement confirmed the stability of P3HT chains under the laser irradiation, i.e. the main P3HT chains were kept chain configuration and bonds after laser in photoexpanded areas. These results imply that orientation of P3HT crystals can be selectively controlled into face-on configuration by the fs-laser irradiation.

[26B1-3] 10:00~10:15

Numerical Analysis of Plasmonic Heating of Silver Nanowires under Femtosecond Laser Irradiation

Jeonghong Ha and Dongsik Kim
POSTECH, Korea

This work analyzes the electromagnetic and thermal phenomena occurring in welding of silver nanowires by femtosecond laser irradiation. We suggest that the nanowires can be joined by a non-thermal mechanism, substantially below the melting point.

[26B1-4] 10:15~10:30

Direct Ultrafast Laser Patterning of Transparent Conducting Layers for Flexible Electronics Fabrication

Mirae Lim¹, Yonghyeon Kim¹, Hyojoong Kim², Hanki Kim², and Jiyeon Choi¹

¹KIMM, Korea, ²Kyung Hee University, Korea

An ultrafast laser was used to ablate transparent conducting layers deposited either by multilayered silver and ITO or silver web. Performance of the devices using them as electrodes was examined to confirm the process' efficiency.