

Room C (103)

Session Title 25C3 / [T02] Nonlinear Optics
Date & Time Tuesday, 25 August, 15:45 ~ 17:45
Session Chair Katsumi Midorikawa (RIKEN, Japan)

[25C3-1] 15:45~16:15 Invited Talk

Optical Constants Measurement of Nonlinear Crystals for Terahertz Generation

Nan El Yu¹, Kyu-Sup Lee¹, Do-Kyeong Ko¹, Shunji Takekawa², and Kenji Kitamura²
¹GIST, Korea, ²National Institute for Materials Science, Japan

Optical constants of nonlinear crystals for terahertz generation were measured by terahertz time-domain spectroscopy. Congruent and stoichiometric crystals of lithium niobate (LiNbO₃) and lithium tantalate (LiTaO₃) were compared in the 0.1 – 2 THz range. Stoichiometric lithium tantalate (SLT) was estimated as a most promising single crystal to generate efficient THz source in an ordinary polarization direction. In addition, temperature dependent material dispersion for SLT was derived in the THz range.

[25C3-2] 16:15~16:30

Four Wave Mixing in 5th Order Cascaded CMOS Compatible Ring Resonators

Li Jin¹, Alessia Pasquazi², Luigi Di Loro², Marco Peccianti², Brent E Little³, David J Moss⁴, Roberto Morandotti⁵, and Sai Tak Chu¹

¹City University of Hong Kong, Hong Kong, China, ²University of Sussex, UK, ³Xi'an Institute of Optics and Precision Mechanics, China, ⁴RMIT University, Australia, ⁵Matériaux et Télécommunications, Canada

We report wavelength conversion via four wave mixing in a CMOS compatible 5th order cascaded microring resonator.

[25C3-3] 16:30~16:45

Second Harmonic Generation from Suspended Graphene Sheets

Kung-Hsuan Lin¹, Shao-Wei Weng¹, Po-Wei Lyu^{1,2}, Tsong-Ru Tsa³, and Wei-Bin Su¹

¹Academia Sinica, Taiwan, ²National Taiwan Ocean University, Taiwan

An ideal freestanding graphene in air is centrosymmetric in three dimensions, and its optical second harmonic generation is inhibited. However, we found strong second harmonic generation from suspended graphene sheets, and attributed this observation to curved sheet in the long range.

[25C3-4] 16:45~17:00

Third-order Seeded Parametric Down-conversion in Silica Submicro-wire

Kee Hwan Nam, Dae Seok Han, and Myeong Soo Kang

KAIST, Korea

We experimentally demonstrate the 3rd-order seeded parametric down-conversion in a silica submicro-wire. Amplification of a 1597.38 nm seed beam is observed upon co-launching a 532.46 nm pump beam in the HE₁₂ mode of the wire.

[25C3-5] 17:00~17:15

Quality Assessment of Quasi-Phase-Matched Gratings by Gaussian Beam Diffraction

Prashant Povel Dwivedi, Pavan Kumar, Heejoon Choi, and Myoungsik Cha
Pusan National University, Korea

Random duty-cycle error is genetic in quasi-phase matched gratings. An estimate of this error is significant to avoid parasitic harmonic generation. This study highlights an advantageous, high resolution method to quantitatively assess the gratings centered on Gaussian beam diffraction.

[25C3-6] 17:15~17:30

Improvement of Frequency-tripling Efficiency through a Walk-off Compensation

Changsoo Jung, Konkuk Kim, Bong-Ahn Yu, Yeung Lak Lee, Woojin Shin, and Young-Chul Noh
GIST, Korea

We experimentally investigated a walk-off-compensation method to improve the ultraviolet output power. We confirmed that the higher output-power improvement can be obtained in the narrower-beam case. The maximum output-power improvement was 3.0 times.

[25C3-7] 17:30~17:45

Control of Optical Rogue Waves in the Femtosecond Supercontinuum Generation Using a Weak Continuous Wave Trigger

Xiaoqi Duan and Qian Li
Peking University, China

We numerically study the characteristics of optical rogue waves in the femtosecond supercontinuum generation. The continuous wave trigger is proved to be an effective way to control optical rogue waves in the femtosecond supercontinuum generation.

Room D (106)

Session Title 25D3 / [T06] Novel Laser Process for Electronic devices
Date & Time Tuesday, 25 August, 15:45 ~ 17:30
Session Chairs Ya Cheng (Shanghai Institute of Optics and Fine Mechanics, China)
Jiyeon Choi (KIMM, Korea)

[25D3-1] 15:45~16:15 Invited Talk

Laser Materials Processing Technologies and the Future

Martin Richardson
University of Central Florida, USA

We present an overview of the advances in the field of laser materials processing, identifying those topics that are new or different, and speculating on their potential for applications in real world scenarios.

[25D3-2] 16:15~16:45 Invited Talk

Laser Doping and Texturing of Silicon for Advanced Optoelectronic Devices

Eric Mazur, Benjamin Franta, David Pastor, Hemi Gandhi, and Alexander Raymond
Harvard University, USA

Irradiating a semiconductor sample with intense laser pulses in the presence of dopants drastically changes the optical, material and electronic properties of the sample. The properties of these processed semiconductors make them useful for photodetectors and, potentially, intermediate band solar cells. This talk discusses the processes that lead to doping and surface texturing, both of which increase the optical absorptance of the material. We will discuss the properties of the resulting material, including the presence of an intermediate band, as well as our work on developing laser-processed silicon photodiodes that are sensitive to sub-bandgap wavelengths. Most recently, we have measured the electron lifetime within the doped material, and we have developed methods to control the dopant profile and the material crystallinity. These findings are expected to be useful in designing laser processed silicon devices.

[25D3-3] 16:45~17:00

Compact, Integrated Femtosecond Lasers for Mobile Display Processing

Eric Mottay¹, Clemens Hoenninger², Rainer Kling², Jiyeon Cho³, and Sung-Hak Cho³
¹Amplitude Systemes, France, ²Alphanov, France, ³KIMM, Korea

The development of new display technologies, such as organic LEDs and flexible displays, require significant advances in laser sources and manufacturing processes. We report on new laser technologies and optimized processes.

[25D3-4] 17:00~17:15

High Energy and High Average Power Optical Fiber Ultrafast Beam Delivery and Compression

Eric Mottay, Florent Guichard, Guillaume Machinet, Yoann Zaouter, and Clemens Hoenninger
Amplitude Systemes, France

We report on fiber delivery of ultrafast lasers. We demonstrate propagation of 500 fs, 1 mJ pulses over a distance of 10 m. We also report 100 W average power transmission, and sub-50 fs pulse compression.

[25D3-5] 17:30~17:45

Vibration Assisted Femtosecond Laser Hole Drilling on Fine Metal Mask for AMOLED

Wonsuk Choi and Sung Hak Cho

¹Korea University of Science and Technology, Korea, ²KIMM, Korea

Using vibration assisted femtosecond laser machining system, we can control hole taper angle directly by adjusting amplitude of vibration.