Oral Session | CLEO-PR2022 | MIR Lasers

MIR Lasers

Session Chair: Shigeki Tokita (Kyoto Univ.)

Tue. Aug 2, 2022 9:00 AM - 10:30 AM Conference Hall (Oval Room) (1F)

[CTuA1A-01 (Invited)] 3.5 µm fiber lasers

[Presentation Style] Online

*David J. Ottaway[1,2], Ori Henderson Sapir[1,3] (1. Dept. Physics and IPAS, The University of Adelaide (Australia), 2. ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav) (Australia), 3. Mirage Photonics (Australia))

9:00 AM - 9:30 AM

[CTuA1A-02] Frequency-shifted feedback mode-locked and tunable 3.5 μm fiber laser and Bragg grating interrogator

[Presentation Style] Online

Ori Henderson-Sapir[1,2], Nathaniel Bawden[1], Antreas Theodosiou[3,4], Kyriacos Kalli[3], Matthew R. Majewski[5], Stuart D. Jackson[5], *David J. Ottaway[1] (1. Department of Physics and Institute of Photonics and Advanced Sensing (Australia), 2. Mirage Photonics (Australia), 3. Photonics and Optical Sensors Research Laboratory, Cyprus University of Technology (Cyprus), 4. Lumoscribe LTD. (Cyprus), 5. MQ Photonics, School of Engineering, Faculty of Science and Engineering, Macquarie University (Australia))

9:30 AM - 9:45 AM

[CTuA1A-03] Highly-efficient CW Fe:ZnSe Laser Amplifier at ~4 μm

[Presentation Style] Onsite

*Enhao Li[1], Hiyori Uehara[1,2], Shigeki Tokita[3], Fedor Potemkin[4], Ryo Yasuhara[1,2] (1. SOKENDAI (Japan), 2. NIFS (Japan), 3. Osaka Univ. (Japan), 4. Moscow State Univ. (Russia))

9:45 AM - 10:00 AM

[CTuA1A-04] Mode-locked Cr:ZnS laser with multiple spectral peaks at molecular vibrational resonances

[Presentation Style] Onsite

*Daiki Okazaki[1], Wenqing Song[1], Ikki Morichika[1], Satoshi Ashihara[1] (1. IIS, The Univ. of Tokyo (Japan))

10:00 AM - 10:15 AM

[CTuA1A-05] 2 μm Ultrabroadband InAs/InP Quantum Dash Emitter for SWIR Tunable Lasers

*Rafael Jumar Chu[1,2], Yeonhwa Kim[1,2], Hosung Kim[3], Seungwan Woo[1,4], Dae-Hwan Ahn[1], Won Jun Choi[1], Daehwan Jung[1,2] (1. Center for Opto-electronic Materials and Devices, Korea Institute of Science and Technology (Korea), 2. University of Science and Technology (Korea), 3. Electronics and Telecommunications Research Institute (Korea), 4. Korea University (Korea))

10:15 AM - 10:30 AM

9:00 AM - 9:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Conference Hall (Oval Room))

[CTuA1A-01 (Invited)] 3.5 µm fiber lasers

[Presentation Style] Online

*David J. Ottaway[1,2], Ori Henderson Sapir[1,3] (1. Dept. Physics and IPAS, The University of Adelaide (Australia), 2. ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav) (Australia), 3. Mirage Photonics (Australia))

[Presentation Style] Online

The introduction of dual wavelength pumping nearly a decade ago has made the 3.5 µm transition in erbium doped fluoride glasses viable. This has enabled a host of new lasers with interesting properties to be developed.

9:30 AM - 9:45 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Conference Hall (Oval Room))

[CTuA1A-02] Frequency-shifted feedback mode-locked and tunable 3.5 m fiber laser and Bragg grating interrogator

[Presentation Style] Online

Ori Henderson-Sapir[1,2], Nathaniel Bawden[1], Antreas Theodosiou[3,4], Kyriacos Kalli[3], Matthew R. Majewski[5], Stuart D. Jackson[5], *David J. Ottaway[1] (1. Department of Physics and Institute of Photonics and Advanced Sensing (Australia), 2. Mirage Photonics (Australia), 3. Photonics and Optical Sensors Research Laboratory, Cyprus University of Technology (Cyprus), 4. Lumoscribe LTD. (Cyprus), 5. MQ Photonics, School of Engineering, Faculty of Science and Engineering, Macquarie University (Australia))

[Presentation Style] Online

A mode-locked, dual-wavelength pumped 3.5 m fiber laser using frequency-shifted feedback is reported. Pulses of 3.8 ps with 8.7 nJ were obtained. An electronically wavelength swept, mid-IR interrogator is built to characterize a mid-IR fiber Bragg grating.

9:45 AM - 10:00 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Conference Hall (Oval Room))

[CTuA1A-03] Highly-efficient CW Fe:ZnSe Laser Amplifier at ~4 μ m

[Presentation Style] Onsite

*Enhao Li[1], Hiyori Uehara[1,2], Shigeki Tokita[3], Fedor Potemkin[4], Ryo Yasuhara[1,2] (1. SOKENDAI (Japan), 2. NIFS (Japan), 3. Osaka Univ. (Japan), 4. Moscow State Univ. (Russia))

[Presentation Style] Onsite

We present a high-efficiency CW Fe:ZnSe laser amplifier seeded by a 4-μm quantum cascade laser. The amplifier obtained a more than fourfold single-pass gain and a maximum extraction efficiency of over 30%.

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Conference Hall (Oval Room))

[CTuA1A-04] Mode-locked Cr:ZnS laser with multiple spectral peaks at molecular vibrational resonances

[Presentation Style] Onsite

*Daiki Okazaki[1], Wenqing Song[1], Ikki Morichika[1], Satoshi Ashihara[1] （1. IIS, The Univ. of Tokyo (Japan)）

[Presentation Style] Onsite

We demonstrate mode-locked oscillation accompanied by multiple spectral peaks at absorption lines of gaseous molecules. Numerical simulations reveal that the modulated spectrum represents peak structure while it evolves in a self-consistent manner inside the cavity.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Conference Hall (Oval Room))

[CTuA1A-05] 2 μ m Ultrabroadband InAs/InP Quantum Dash Emitter for SWIR Tunable Lasers

*Rafael Jumar Chu[1,2], Yeonhwa Kim[1,2], Hosung Kim[3], Seungwan Woo[1,4], Dae-Hwan Ahn[1], Won Jun Choi[1], Daehwan Jung[1,2] （1. Center for Opto-electronic Materials and Devices, Korea Institute of Science and Technology (Korea), 2. University of Science and Technology (Korea), 3. Electronics and Telecommunications Research Institute (Korea), 4. Korea University (Korea)）

We present a 2 μm ultrabroadband InAs quantum dash laser grown epitaxially with a 531 nm spontaneous emission bandwidth under continuous wave mode, and a lasing threshold current of 3.5 kA/cm^2 under pulsed mode.

Oral Session | CLEO-PR2022 | Soliton Fiber Lasers

Soliton Fiber Lasers

Session Chairs: Jungwon Kim (KAIST), Shigeki Tokita (Kyoto Univ.)

Tue. Aug 2, 2022 11:00 AM - 12:00 PM Conference Hall (Oval Room) (1F)

[CTuA1B-01 (Invited)] Temporal Solitons in Coherently driven Active Fiber Resonators

[Presentation Style] Online

*Francois Leo[1] (1. Universite libre de Bruxelles (Belgium))

11:00 AM - 11:30 AM

[CTuA1B-02] Numerical Analysis on the Effects of Spectral Ripple for Saturable Absorber Based Mode-Locking

[Presentation Style] Onsite

*Bowen Liu[1], Shinji Yamashita[1], Sze Yun Set[1] (1. The University of Tokyo (Japan))

11:30 AM - 11:45 AM

[CTuA1B-03] Characteristics of Spectral Peaking in Ultrashort Pulse Fiber Lasers with Molecular Gas Cell

[Presentation Style] Onsite

*Norihiko Nishizawa[1], Shotaro Kitajima[1], Youichi Sakakibara[2] (1. Nagoya University (Japan), 2. AIST (Japan))

11:45 AM - 12:00 PM

11:00 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Conference Hall (Oval Room))

[CTuA1B-01 (Invited)] Temporal Solitons in Coherently driven Active Fiber Resonators
[Presentation Style] Online

*Francois Leo[1] (1. Universite libre de Bruxelles (Belgium))

[Presentation Style] Online

In this talk I will discuss our recent results about active cavity solitons. We show how coherent and incoherent gain mechanisms can both be harnessed for stable soliton generation

11:30 AM - 11:45 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Conference Hall (Oval Room))

[CTuA1B-02] Numerical Analysis on the Effects of Spectral Ripple for Saturable Absorber Based Mode-Locking
[Presentation Style] Onsite

*Bowen Liu[1], Shinji Yamashita[1], Sze Yun Set[1] (1. The University of Tokyo (Japan))

[Presentation Style] Onsite

We report numerical study on spectral ripple effects in a mode-locked fiber laser towards steady single-pulse states. Maps of nonlinear saturable absorption threshold required for stable mode-locking generation are explored. Ripple cancellation is also demonstrated.

11:45 AM - 12:00 PM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Conference Hall (Oval Room))

[CTuA1B-03] Characteristics of Spectral Peaking in Ultrashort Pulse Fiber Lasers with Molecular Gas Cell
[Presentation Style] Onsite

*Norihiko Nishizawa[1], Shotaro Kitajima[1], Youichi Sakakibara[2] (1. Nagoya University (Japan), 2. AIST (Japan))

[Presentation Style] Onsite

Characteristics of spectral peaking in fiber laser were investigated both experimentally and numerically. Ultrashort soliton pulse with multiple sharp spectral peaks were generated stably. The peak intensity was increased exponentially for the magnitude of absorption.

Ultrafast Spectroscopy and Coherent Control I

Session Chairs: Kazutaka Nakamura (Tokyo Institute of Technology), Tadashi Togashi (JASRI)

Tue. Aug 2, 2022 10:00 AM - 10:30 AM Room 204 (2F)

[CTuA2C-01] Coherent quench of superconducting state using optical vortex pulses

[Presentation Style] Onsite

*Yasunori Toda[1], Satoshi Tsuchiya[1], Keisaku Yamane[1], Ryuji Morita[1], Migaku Oda[1], Tomaz Mertelj[2], Dragan Mihailovic[2] （1. Hokkaido University (Japan), 2. Jozef Stefan Institute (Slovenia)）

10:00 AM - 10:15 AM

[CTuA2C-02] Ultrafast, all-optical, and highly efficient imaging of molecular chirality via low-order nonlinear processes

[Presentation Style] Online

Josh Vogwell[1], Olga Smirnova[2,3], *David Ayuso[1,2] （1. Imperial College London (UK), 2. Max-Born-Institut Berlin (Germany), 3. Technische Universitat Berlin (Germany)）

10:15 AM - 10:30 AM

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 10:00 AM - 10:30 AM Room 204)

[CTuA2C-01] Coherent quench of superconducting state using optical vortex pulses

[Presentation Style] Onsite

*Yasunori Toda[1], Satoshi Tsuchiya[1], Keisaku Yamane[1], Ryuji Morita[1], Migaku Oda[1], Tomaz Mertelj[2], Dragan Mihailovic[2] (1. Hokkaido University (Japan), 2. Jozef Stefan Institute (Slovenia))

[Presentation Style] Onsite

Spatially modulated superconducting states are generated using superconducting coherent quenches induced by ultrashort optical vortex pulses. The proof-of-principle of super-resolution of the SC response using the technique is also demonstrated.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 10:00 AM - 10:30 AM Room 204)

[CTuA2C-02] Ultrafast, all-optical, and highly efficient imaging of molecular chirality via low-order nonlinear processes

[Presentation Style] Online

Josh Vogwell[1], Olga Smirnova[2,3], *David Ayuso[1,2] (1. Imperial College London (UK), 2. Max-Born-Institut Berlin (Germany), 3. Technische Universitat Berlin (Germany))

[Presentation Style] Online

We introduce an ultrafast chiro-optical method based on sum-frequency generation. In contrast to traditional implementations, the medium's chirality is encoded in the *intensity* of the nonlinear response, rather than in its *phase*, with extreme efficiency.

Ultrafast Spectroscopy and Coherent Control II

Session Chairs: Takao Fuji (Toyota Technological Institute), Ryuji Morita (Hokkaido Univ.)

Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 204 (2F)

[CTuA2D-01] Ultrafast quantum-path interferometry to study decoherence time of electron-phonon coupled states in GaAs using polarized femtosecond pulses

[Presentation Style] Onsite

*Itsuki Takagi[1,2], Masaki Suda[1,2], Yosuke Kayanuma[1,3], Kazutaka G. Nakamura[1,2] (1. MSL Tokyo Tech (Japan), 2. Materials. Eng. Tokyo Tech (Japan), 3. Osaka Prefecture Univ. (Japan))

11:00 AM - 11:15 AM

[CTuA2D-02] Population Manipulation with Chirped Pulses in InAs Quantum Dots with Resonators

[Presentation Style] Onsite

*Kotaro Miyauchi[1], Yutaro Kinoshita[1], Kouichi Akahane[2], Junko Ishi-Hayase[1] (1. Keio Univ. (Japan), 2. NICT (Japan))

11:15 AM - 11:30 AM

[CTuA2D-03] Photoinduced Non-thermal Topological Phase Transition in Bi_2Se_3 Driven by Coherent Interlayer Vibrations

[Presentation Style] Onsite

*Tae Gwan Park Park[1], Junho Park Park[1], Eon Taek Oh[1], Hong Ryeol Na[2], Seung-Hyun Chun[2], Sunghun Lee[2], Fabian Rotermund[1] (1. KAIST (Korea), 2. Sejong Univ. (Korea))

11:30 AM - 11:45 AM

[CTuA2D-04] Ultrafast All-Optical Switching with High-Quality Graphene and its Polarization Effect

[Presentation Style] Onsite

*Tomoki Kusaka[1], Akihiro Furube[1], Tetsuro Katayama[1], Hiroki Kishikawa[1], Yasuhide Ohno[1], Masao Nagase[1], Junichi Fujikata[1] (1. Tokushima Univ. (Japan))

11:45 AM - 12:00 PM

11:00 AM - 11:15 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 204)

[CTuA2D-01] Ultrafast quantum-path interferometry to study decoherence time of electron-phonon coupled states in GaAs using polarized femtosecond pulses [Presentation Style] Onsite

*Itsuki Takagi[1,2], Masaki Suda[1,2], Yosuke Kayanuma[1,3], Kazutaka G. Nakamura[1,2] (1. MSL Tokyo Tech (Japan), 2. Materials. Eng. Tokyo Tech (Japan), 3. Osaka Prefecture Univ. (Japan))

[Presentation Style] Onsite

Decoherence time of the electron-phonon coupled states in n-GaAs has been studied with ultrafast quantum-path interferometry using a pair of polarized 60-fs pulses with relative phase locking and quantum model calculations.

11:15 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 204)

[CTuA2D-02] Population Manipulation with Chirped Pulses in InAs Quantum Dots with Resonators [Presentation Style] Onsite

*Kotaro Miyauchi[1], Yutaro Kinoshita[1], Kouichi Akahane[2], Junko Ishi-Hayase[1] (1. Keio Univ. (Japan), 2. NICT (Japan))

[Presentation Style] Onsite

We demonstrate the robust population inversion of excitons with a large inhomogeneous broadening using chirped pulses in self-assembled InAs quantum dots embedded in optical resonator.

11:30 AM - 11:45 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 204)

[CTuA2D-03] Photoinduced Non-thermal Topological Phase Transition in Bi_2Se_3 Driven by Coherent Interlayer Vibrations [Presentation Style] Onsite

*Tae Gwan Park Park[1], Junho Park Park[1], Eon Taek Oh[1], Hong Ryeol Na[2], Seung-Hyun Chun[2], Sunghun Lee[2], Fabian Rotermund[1] (1. KAIST (Korea), 2. Sejong Univ. (Korea))

[Presentation Style] Onsite

We present the non-thermal route of photoinduced topological phase transition driven by interlayer vibrations.

11:45 AM - 12:00 PM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 204)

[CTuA2D-04] Ultrafast All-Optical Switching with High-Quality Graphene and its Polarization Effect

[Presentation Style] Onsite

*Tomoki Kusaka[1], Akihiro Furube[1], Tetsuro Katayama[1], Hiroki Kishikawa[1], Yasuhide Ohno[1], Masao Nagase[1], Junichi Fujikata[1] （1. Tokushima Univ. (Japan)）

[Presentation Style] Onsite

All-optical switching operation with spatial incidence and its polarization effect was investigated using the saturable absorption property of the graphene on SiC. 120fs ultrafast optical switching operation and about 8% absorption change could be achieved.

Single Photon Sources

Session Chairs: Kai-Hong Luo (Paderborn Univ.), Hiroki Takesue (NTT Corp.)
Tue. Aug 2, 2022 9:00 AM - 10:30 AM Mid-sized Hall A (1F)

[CTuA7A-01 (Tutorial)] Quantum advantage with photons
[Presentation Style] Online
*Chao-Yang Lu[1] （1. University of Science and Technology of China (China)）
9:00 AM - 10:00 AM

[CTuA7A-02] Scalable Quantum Dot Single-photon Sources Based on Dual-mode Waveguides
[Presentation Style] Online
Leonardo Midolo[1], *Camille Papon[1], Xiaoyan Zhou[1], Ravitej Uppu[1], Ying Wang[1], Sven Scholz[2], Andreas D. Wieck[2], Arne Ludwig[2], Peter Lodahl[1] （1. University of Copenhagen (Denmark), 2. Ruhr-Universität Bochum (Germany)）
10:00 AM - 10:15 AM

[CTuA7A-03] Low-Temperature Spectroscopy of Single-Photon Emitters in Irradiation-Engineered Hexagonal Boron Nitride
[Presentation Style] Onsite
*Moritz Fischer[1], Ali Sajid[1], Alexander Hötger[2], Kristian Sommer Thygesen[1], Sanshui Xiao[1], Martijn Wubs[1], Alexander Holleitner[2], Nicolas Stenger[1] （1. Technical Univ. of Denmark (DTU) (Denmark), 2. Technical Univ. of Munich (Germany)）
10:15 AM - 10:30 AM

9:00 AM - 10:00 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Mid-sized Hall A)

[CTuA7A-01 (Tutorial)] Quantum advantage with photons
[Presentation Style] Online

*Chao-Yang Lu[1] (1. University of Science and Technology of China (China))

[Presentation Style] Online

We have implemented boson sampling, an intermediate quantum computer model for demonstrating quantum computational advantage and refuting. Extended Church Turing Thesis, with up to 113 photon clicks after a 144-mode ultralow-loss interferometer.

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Mid-sized Hall A)

[CTuA7A-02] Scalable Quantum Dot Single-photon Sources Based on Dual-mode Waveguides
[Presentation Style] Online

Leonardo Midolo[1], *Camille Papon[1], Xiaoyan Zhou[1], Ravitej Uppu[1], Ying Wang[1], Sven Scholz[2], Andreas D. Wieck[2], Arne Ludwig[2], Peter Lodahl[1] (1. University of Copenhagen (Denmark), 2. Ruhr-Universität Bochum (Germany))

[Presentation Style] Online

We present a photonic integrated circuit for the simultaneous resonant excitation of two distinct InAs quantum dots and for the generation of coherent streams of single photons, towards on-chip quantum information and computing.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Mid-sized Hall A)

[CTuA7A-03] Low-Temperature Spectroscopy of Single-Photon Emitters in Irradiation-Engineered Hexagonal Boron Nitride
[Presentation Style] Onsite

*Moritz Fischer[1], Ali Sajid[1], Alexander Hötger[2], Kristian Sommer Thygesen[1], Sanshui Xiao[1], Martijn Wubs[1], Alexander Holleitner[2], Nicolas Stenger[1] (1. Technical Univ. of Denmark (DTU) (Denmark), 2. Technical Univ. of Munich (Germany))

[Presentation Style] Onsite

To identify the microscopic origin of single-photon emitters in hexagonal boron nitride, we perform low-temperature spectroscopy. We observe strong photoluminescence at two different excitation lasers that hint at a phonon-assisted excitation scheme

Electrical Nonlinear Equalization

Session Chair: Fukutaro Hamaoka (NTT Corp.)

Tue. Aug 2, 2022 9:30 AM - 10:30 AM Room 207 (2F)

[CTuA9C-01] Nonlinear Eye Skew Equalizers for Directly-Modulated Laser based 400G-LR Transmission Systems

[Presentation Style] Onsite

*Jyh-Kae Lin[1], Chun-Yen Chuang[1], Kuan-Hao Liu[1], Jyehong Chen[1], Chin-Shih Huang[2], Hao-Chun Hsieh[2], Hung-Chun Pan[2], Tsung-Han Lee[2], Chia-Wei Kao[2] （1. National Yang Ming Chiao Tung Univ. (Taiwan), 2. Wistron Corp. (Taiwan)）

9:30 AM - 9:45 AM

[CTuA9C-02] 10 dB Sensitivity Improvement by Employing Volterra Equalization for 400G-ZR 80 km Pluggable Coherent Transceiver

[Presentation Style] Onsite

*Yu Cheng Su[1], Chun-Yen Chuang[1], Yen-Hsiang Tseng[1], Nick Fan[2], Louis Lin[2], Jack Cheng[2], Jyehong Chen[1] （1. National Yang Ming Chiao Tung Univ. (Taiwan), 2. Optoway Tech. Inc. (Taiwan)）

9:45 AM - 10:00 AM

[CTuA9C-03] Simplified Pre-Distortion Technique for PAM4 Modulation based on a Micro-Ring Modulator

[Presentation Style] Online

Kai-Wen Chang[1], *Yu-Cheng Yu[1], Chia-Chien Wei[1], Chin Shih Huang[2], Hao Chun Hsieh[2], Hung Chun Pan[2], Wei-Jo Ting[2], Heng Li[2] （1. National Sun Yat-sen University (Taiwan), 2. Wistron Corporation (Taiwan)）

10:00 AM - 10:15 AM

[CTuA9C-04] Elimination of Nonlinear Distortion in DML-based OFDM Transmission Using Novel Pre-distortion

[Presentation Style] Online

Szu-Chi Huang[1], *Yu-Cheng Yu[1], Chia-Chien Wei[1], Chin Shih Huang[2], Hao Chun Hsieh[2], Hung Chun Pan[2], Wei-Jo Ting[2], Heng Li[2] （1. National Sun Yat-sen University (Taiwan), 2. Wistron Corporation (Taiwan)）

10:15 AM - 10:30 AM

9:30 AM - 9:45 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Room 207)

[CTuA9C-01] Nonlinear Eye Skew Equalizers for Directly-Modulated Laser based 400G-LR Transmission Systems
[Presentation Style] Onsite

*Jyh-Kae Lin[1], Chun-Yen Chuang[1], Kuan-Hao Liu[1], Jyehong Chen[1], Chin-Shih Huang[2], Hao-Chun Hsieh[2], Hung-Chun Pan[2], Tsung-Han Lee[2], Chia-Wei Kao[2] （1. National Yang Ming Chiao Tung Univ. (Taiwan), 2. Wistron Corp. (Taiwan)）

[Presentation Style] Onsite

We propose two nonlinear eye-skew equalizers for 400G-LR4 transceivers using DMLs. After equalizers, the eye-skew is effectively reduced, and the system shows a 3.2 dB power budget improvement and more than 10^7 BER floor reduction.

9:45 AM - 10:00 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Room 207)

[CTuA9C-02] 10 dB Sensitivity Improvement by Employing Volterra Equalization for 400G-ZR 80 km Pluggable Coherent Transceiver
[Presentation Style] Onsite

*Yu Cheng Su[1], Chun-Yen Chuang[1], Yen-Hsiang Tseng[1], Nick Fan[2], Louis Lin[2], Jack Cheng[2], Jyehong Chen[1] （1. National Yang Ming Chiao Tung Univ. (Taiwan), 2. Optoway Tech. Inc. (Taiwan)）

[Presentation Style] Onsite

We have successfully demonstrated a -22 dBm receiver sensitivity 400G-ZR coherent transmission system over 80km. The extra 10 dB link budget has potential to extend the distance to 120 km for next generation 400G-ZR+ applications.

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Room 207)

[CTuA9C-03] Simplified Pre-Distortion Technique for PAM4 Modulation based on a Micro-Ring Modulator
[Presentation Style] Online

Kai-Wen Chang[1], *Yu-Cheng Yu[1], Chia-Chien Wei[1], Chin Shih Huang[2], Hao Chun Hsieh[2], Hung Chun Pan[2], Wei-Jo Ting[2], Heng Li[2] （1. National Sun Yat-sen University (Taiwan), 2. Wistron Corporation (Taiwan)）

[Presentation Style] Online

This study analyzes the performance of digital pre-distortion (DPD) for micro-ring-modulator-based PAM4 modulation. With limited taps for practicality, the optimal design of the DPD was shown to depend on the operating conditions of the modulator.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Room 207)

[CTuA9C-04] Elimination of Nonlinear Distortion in DML-based OFDM Transmission Using Novel Pre-distortion [Presentation Style] Online

Szu-Chi Huang[1], *Yu-Cheng Yu[1], Chia-Chien Wei[1], Chin Shih Huang[2], Hao Chun Hsieh[2], Hung Chun Pan[2], Wei-Jo Ting[2], Heng Li[2] （1. National Sun Yat-sen University (Taiwan), 2. Wistron Corporation (Taiwan)）

[Presentation Style] Online

Based on Volterra filtering, a novel pre-distortion method without significantly altering the transmitted spectra was proposed to eliminate nonlinear distortion in DML-based OFDM transmission. The scheme experimentally increased the capacity by >60% after 150-km transmission.

Oral Session | CLEO-PR2022 | Space Division Multiplexing

Space Division Multiplexing

Session Chair: Manabu Arikawa (NEC Corp.)

Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 207 (2F)

[CTuA9D-01 (Invited)] Generalized Stokes-space analysis of modal dispersion in fibers for space-division multiplexing with mode-dependent loss

[Presentation Style] Online

*Cristian Antonelli[1], Antonio Mecozzi[1], Mark Shtaif[2], Nicolas Keith Fontaine[3], Haoshuo Chen[3], Mikael Mazur[3], Roland Ryf[3], （1. University of L'Aquila (Italy), 2. University of Tel Aviv (Israel), 3. Nokia Bell Labs (United States of America)）

11:00 AM - 11:30 AM

[CTuA9D-02 (Invited(P))] Cumulative Dynamic Inter-Core Skew Measurements in Spooled Uncoupled Core Multicore Fibers

[Presentation Style] Onsite

*Ruben Luis[1], Benjamin J. Puttnam[1], Georg Rademacher[1], Yoshinari Awaji[1], Hideaki Furukawa[1] （1. NICT (Japan)）

11:30 AM - 12:00 PM

11:00 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 207)

[CTuA9D-01 (Invited)] Generalized Stokes-space analysis of modal dispersion in fibers for space-division multiplexing with mode-dependent loss
[Presentation Style] Online

*Cristian Antonelli[1], Antonio Mecozzi[1], Mark Shtaif[2], Nicolas Keith Fontaine[3], Haoshuo Chen[3], Mikael Mazur[3], Roland Ryf[3], （1. University of L'Aquila (Italy), 2. University of Tel Aviv (Israel), 3. Nokia Bell Labs (United States of America)))

[Presentation Style] Online

We present a unified model for modal dispersion and mode-dependent loss in fibers for space-division multiplexed transmission. The proposed model, based on a generalized Stokes-space representation of multi-modal fields, is validated by comparison with experimental data.

11:30 AM - 12:00 PM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 207)

[CTuA9D-02 (Invited(P))] Cumulative Dynamic Inter-Core Skew Measurements in Spooled Uncoupled Core Multicore Fibers
[Presentation Style] Onsite

*Ruben Luis[1], Benjamin J. Puttnam[1], Georg Rademacher[1], Yoshinari Awaji[1], Hideaki Furukawa[1] （1. NICT (Japan))

[Presentation Style] Onsite

We measured the propagation delay fluctuations and dynamic inter-core skew of 125 um cladding, 4-core fibers with 15.7, 29.5, and 50 km lengths. The measurements provide insight on the skew dependence on transmission distance.

Thin-film LN and AlN Devices

Session Chair: Toshimasa Umezawa (NICT)

Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 104&105 (1F)

[CTuA11C-01 (Invited)] Integrated lithium niobate photonics: when performance meets scalability
[Presentation Style] Online

*Mian Zhang[1] (1. HyperLight (United States of America))

9:00 AM - 9:30 AM

[CTuA11C-02] Efficient Lithium Niobate on Insulator Phase Modulator Using Light Recirculation
[Presentation Style] Onsite

*Haijin Huang[1], Xu Han[2], Armandas Balčytis[1], Aditya Dubey[1], Andreas Boes[1], Thach Nguyen[1], Guanghui Ren[1], Mengxi Tan[1], Yonghui Tian[2], Arnan Mitchell[1] (1. Integrated Photonics and Applications Centre, School of Engineering, RMIT University (Australia), 2. Key Laboratory for Magnetism and Magnetic Materials of MOE, School of Physical Science and Technology, Lanzhou University (China))

9:30 AM - 9:45 AM

[CTuA11C-03] Integrated spatiotemporal circulator on thin-film lithium niobate platform
[Presentation Style] Onsite

*Rebecca A Russell[1,2] (1. RMIT University (Australia), 2. InPAC (Australia))

9:45 AM - 10:00 AM

[CTuA11C-04] Low-loss Adiabatic Couplers on Thin-Film Lithium Niobate with Benzocyclobutene (BCB) Waveguide
[Presentation Style] Online

*Hao Liu[1], Xuecheng Liu[1], Bing Xiong[1], Changzheng Sun[1], Zhibiao Hao[1], Lai Wang[1], Jian Wang[1], Yanjun Han[1], Hongtao Li[1], Yi Luo[1] (1. Tsinghua Univ. (China))

10:00 AM - 10:15 AM

[CTuA11C-05] High-Efficiency Overlay Grating Fiber-Chip Couplers for Aluminum nitride-on-Sapphire Waveguide Platform
[Presentation Style] Onsite

*Shreelakshmi KP[1], Srinivasan Raghavan [1], Shankar Kumar Selvaraja[1] (1. Indian Institute of Science (India))

10:15 AM - 10:30 AM

9:00 AM - 9:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 104&105)

[CTuA11C-01 (Invited)] Integrated lithium niobate photonics: when performance meets scalability

[Presentation Style] Online

*Mian Zhang[1] (1. HyperLight (United States of America))

[Presentation Style] Online

Thin film lithium niobate photonics can provide high performance and scalable solution for optical communication applications. We discuss the advantage, challenge and future promises of this platform.

9:30 AM - 9:45 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 104&105)

[CTuA11C-02] Efficient Lithium Niobate on Insulator Phase Modulator Using Light Recirculation

[Presentation Style] Onsite

*Haijin Huang[1], Xu Han[2], Armandas Balčytis[1], Aditya Dubey[1], Andreas Boes[1], Thach Nguyen[1], Guanghui Ren[1], Mengxi Tan[1], Yonghui Tian[2], Arnan Mitchell[1] (1. Integrated Photonics and Applications Centre, School of Engineering, RMIT University (Australia), 2. Key Laboratory for Magnetism and Magnetic Materials of MOE, School of Physical Science and Technology, Lanzhou University (China))

[Presentation Style] Onsite

We describe an advanced integrated optical phase modulator design that harnesses a light recycling approach to exhibit an up to 8 times enhanced modulation response for an equivalent optical and electrical input power.

9:45 AM - 10:00 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 104&105)

[CTuA11C-03] Integrated spatiotemporal circulator on thin-film lithium niobate platform

[Presentation Style] Onsite

*Rebecca A Russell[1,2] (1. RMIT University (Australia), 2. InPAC (Australia))

[Presentation Style] Onsite

We report the simulation and experimental demonstration of an integrated electro-optic modulator based isolator/circulator on the lithium niobate on insulator optical waveguide platform, achieving 20dB theoretical and 9dB experimental isolation.

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 104&105)

[CTuA11C-04] Low-loss Adiabatic Couplers on Thin-Film Lithium Niobate with Benzocyclobutene (BCB) Waveguide

[Presentation Style] Online

*Hao Liu[1], Xuecheng Liu[1], Bing Xiong[1], Changzheng Sun[1], Zhibiao Hao[1], Lai Wang[1], Jian Wang[1], Yanjun Han[1], Hongtao Li[1], Yi Luo[1] （1. Tsinghua Univ. (China)）

[Presentation Style] Online

Adiabatic fiber-to-chip edge coupler based on BCB guiding waveguide and bilayer thin-film lithium niobate (TFLN) taper is proposed, and ultra-low coupling loss of 0.9 dB/facet between 3.5-μm mode-field-diameter (MFD) fiber and TFLN waveguide is recorded.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 104&105)

[CTuA11C-05] High-Efficiency Overlay Grating Fiber-Chip Couplers for Aluminum nitride-on-Sapphire Waveguide Platform

[Presentation Style] Onsite

*Shreelakshmi KP[1], Srinivasan Raghavan [1], Shankar Kumar Selvaraja[1] （1. Indian Institute of Science (India)）

[Presentation Style] Onsite

Fiber-chip grating couplers in AlN-on-Sapphire platform with a coupling efficiency of -5.5 dB/coupler is demonstrated, best reported so far. This enables the development of possible strategies to harness nonlinear photonics with the AlN platform.

Oral Session | CLEO-PR2022 | Silicon Photonics

Silicon Photonics

Session Chair: Takuo Tanemura (Univ. of Tokyo)

Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 104&105 (1F)

[CTuA11D-01 (Invited)] Silicon Photonics Integrated Circuit for Co-Packaged Optical-IO

[Presentation Style] Online

*Yuliya Akulova[1], Saeed Fathololoumi[1], Kimchau Nguyen[1], Hari Mahalingam[1], Pegah Seddighian[1], Reece Defrees[1], Christian Malouin[1], Kadhair Al-hemyari[1], Daniel Zhu[1], Ling Liao[1], Thomas Liljeberg[1] (1. Intel Corporation (United States of America))

11:00 AM - 11:30 AM

[CTuA11D-02] Optimized Design of Inductive-peaking Si Microring Modulator for Operating Bandwidth over 65 GHz.

[Presentation Style] Online

*Hsiang-Chih Kao[1,2], Ming-Wei Lin[2], Ming-Chang Lee[1,3] (1. Institute of Photonics Technologies,National Tsinghua Univ. (Taiwan), 2. Taiwan Semiconductor Research Institute (Taiwan), 3. Department of Electrical Engineering, National Tsing Hua Univ. (Taiwan))

11:30 AM - 11:45 AM

[CTuA11D-03] Highly efficient power splitter with arbitrary ratios based on inverse shape optimization

[Presentation Style] Online

*Junpeng Liao[1], Ye Tian[1], Zirong Yang[1], Zhe Kang[2], Qinghui Jin[1], Xiaowei Zhang[1] (1. Ningbo Univ. (China), 2. Zhejiang Univ. (China))

11:45 AM - 12:00 PM

11:00 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 104&105)

[CTuA11D-01 (Invited)] Silicon Photonics Integrated Circuit for Co-Packaged Optical-IO
[Presentation Style] Online

*Yuliya Akulova[1], Saeed Fathololoumi[1], Kimchau Nguyen[1], Hari Mahalingam[1], Pegah Seddighian[1], Reece Defrees[1], Christian Malouin[1], Kadhair Al-hemyari[1], Daniel Zhu[1], Ling Liao[1], Thomas Liljeberg[1] (1. Intel Corporation (United States of America))

[Presentation Style] Online

Explosive growth of intra-datacenter traffic and scaling of compute fabric drive rapid evolution of the optical I/O architectures. We review advancements in silicon photonics manufacturing platform towards multi-Tb/s optical interconnects.

11:30 AM - 11:45 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 104&105)

[CTuA11D-02] Optimized Design of Inductive-peaking Si Microring Modulator for Operating Bandwidth over 65 GHz.
[Presentation Style] Online

*Hsiang-Chih Kao[1,2], Ming-Wei Lin[2], Ming-Chang Lee[1,3] (1. Institute of Photonics Technologies,National Tsinghua Univ. (Taiwan), 2. Taiwan Semiconductor Research Institute (Taiwan), 3. Department of Electrical Engineering, National Tsing Hua Univ. (Taiwan))

[Presentation Style] Online

We design a high-speed inductive-peaking Si microring modulator integrated with an on-chip spiral inductor to extend the 3dB operating bandwidth beyond 65GHz and increase the conversion gain by 5 dB. A 64Gb/s transmission is demonstrated.

11:45 AM - 12:00 PM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 104&105)

[CTuA11D-03] Highly efficient power splitter with arbitrary ratios based on inverse shape optimization
[Presentation Style] Online

*Junpeng Liao[1], Ye Tian[1], Zirong Yang[1], Zhe Kang[2], Qinghui Jin[1], Xiaowei Zhang[1] (1. Ningbo Univ. (China), 2. Zhejiang Univ. (China))

[Presentation Style] Online

Adjoint shape optimization method is implemented to design SOI-based power splitters with arbitrary ratios. Splitters with ratios of 1:2, 1:4 and 1:8 are demonstrated with loss below 0.28 dB over a bandwidth of 100 nm.

2D and Nanocarbon Materials III

Session Chairs: Kazunari Matsuda (Kyoto Univ.), Yuhei Miyauchi (Kyoto Univ.)
Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 206 (2F)

[CTuA14C-01 (Invited)] Ultrastrong Light-Matter and Matter-Matter Coupling
[Presentation Style] Onsite
*Junichiro Kono[1] (1. Rice University (United States of America))
9:00 AM - 9:30 AM

[CTuA14C-02 (Invited)] Controlling Emission Wavelength and Chirality of Quantum Emitters in 2D Heterostructures
[Presentation Style] Onsite
*Han Htoon[1] (1. Los Alamos National Laboratory (United States of America))
9:30 AM - 10:00 AM

[CTuA14C-03] Gate tunable moiré excitonic states in twisted $WSe_2/MoSe_2$ heterobilayers
[Presentation Style] Onsite
*Duanfei Dong[1], Wenjin Zhang[1], Kenji Watanabe[2], Takashi Taniguchi[3], Keisuke Shinokita[1], Kazunari Matsuda[1] (1. Inst. of Advanced Energy, Kyoto Univ. (Japan), 2. Res. Center for Functional Materials, National Inst. for Materials Sci. (Japan), 3. Int'l Center for Materials Nanoarchitectonics, National Inst. for Materials Sci. (Japan))
10:00 AM - 10:15 AM

[CTuA14C-04] Correlation Between Optical Absorption and Twisted Angle of Bilayer Graphene Observed by High-Resolution Reflectance Confocal Laser Microscopy
[Presentation Style] Online
*Wei-Shiuan Tseng[1], Ming-Che Chan[1], Yen-Chun Chen[2], Bai-Heng Shiue[1], Tzi-I Tsai[1], Chii-Dong Chen[2] (1. Natioanl Yang-Ming Chiao-Tung University (Taiwan), 2. Institute of Physics, Academia Sinica (Taiwan))
10:15 AM - 10:30 AM

9:00 AM - 9:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 206)

[CTuA14C-01 (Invited)] Ultrastrong Light-Matter and Matter-Matter Coupling
[Presentation Style] Onsite

*Junichiro Kono[1] （1. Rice University (United States of America)）

[Presentation Style] Onsite

This talk will describe our recent studies of light-matter and matter-matter coupling phenomena in condensed matter in the ultrastrong coupling regime.

9:30 AM - 10:00 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 206)

[CTuA14C-02 (Invited)] Controlling Emission Wavelength and Chirality of Quantum Emitters in 2D Heterostructures
[Presentation Style] Onsite

*Han Htoon[1] （1. Los Alamos National Laboratory (United States of America)）

[Presentation Style] Onsite

Quantum emitters capable of operating in previously in assessable telecommunication wavelength range were realized in $MoTe_2$ multilayers. Proximity induced chiral quantum light generation is also achieved via strain-engineering of $WSe_2/NiPS_3$ heterostructures.

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 206)

[CTuA14C-03] Gate tunable moiré excitonic states in twisted $WSe_2/MoSe_2$ heterobilayers
[Presentation Style] Onsite

*Duanfei Dong[1], Wenjin Zhang[1], Kenji Watanabe[2], Takashi Taniguchi[3], Keisuke Shinokita[1], Kazunari Matsuda[1] （1. Inst. of Advanced Energy, Kyoto Univ. (Japan), 2. Res. Center for Functional Materials, National Inst. for Materials Sci. (Japan), 3. Int'l Center for Materials Nanoarchitectonics, National Inst. for Materials Sci. (Japan)）

[Presentation Style] Onsite

We revealed the impact of charging effects on heterobilayers. The additional peaks in photoluminescence spectra under the gate voltage originate from the moiré-trapped trions. The temperature-dependent result clarified the thermal activation of the moiré trions.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:30 AM Room 206)

[CTuA14C-04] Correlation Between Optical Absorption and Twisted Angle of Bilayer Graphene Observed by High-Resolution

Reflectance Confocal Laser Microscopy [Presentation Style] Online

*Wei-Shiuan Tseng[1], Ming-Che Chan[1], Yen-Chun Chen[2], Bai-Heng Shiue[1], Tzi-I Tsai[1], Chii-Dong Chen[2] （1. Natioanl Yang-Ming Chiao-Tung University (Taiwan), 2. Institute of Physics, Academia Sinica (Taiwan)）

[Presentation Style] Online

We report a systematic study of the optical absorption of twisted bilayer graphene across a broad range of twist angles from 0˚ to 30˚ firstly using a home-made, high-resolution reflectance confocal laser microscopy system.

Photothermal and Optical Force

Session Chair: Miya Ishihara (National Defense Medical Collage)
Tue. Aug 2, 2022 9:00 AM - 10:15 AM Room 201&202 (2F)

[CTuA15C-01 (Invited(P))] High-speed Live-cell Vibrational Imaging with a Mid-infrared Photothermal Quantitative Phase Microscope
[Presentation Style] Onsite
*Genki Ishigane[1], Keiichiro Toda[1], Miu Tamamitsu[1], Hiroyuki Shimada[2], Takuro Ideguchi[1,2] (1. Department of Physics, The University of Tokyo (Japan), 2. Institute for Photon Science and Technology, The University of Tokyo (Japan))
9:00 AM - 9:30 AM

[CTuA15C-02] Heat-mediated optical manipulation of Janus particle energized by photonic nanojet
[Presentation Style] Online
*Yuxuan Ren[1], Huade Mao[2], Cihang Kong[1], Bo Li[1], Kenneth K. Y. Wong[2] (1. Fudan University (China), 2. Hong Kong University (Hong Kong))
9:30 AM - 9:45 AM

[CTuA15C-03] Single-Neuron Stimulation with a Focused Femtosecond Laser
[Presentation Style] Onsite
*Yumi Segawa[1], Wataru Minoshima[1], Kyoko Masui[1], Chie Hosokawa[1] (1. Osaka City Univ. (Japan))
9:45 AM - 10:00 AM

[CTuA15C-04] Sensitive Detection of Biological Nanoparticles by Controlled Optical Force in Microflow
[Presentation Style] Onsite
*Kana Fujiwara[1,2,3], Yumiko Takagi[1,2], Mamoru Tamura[2,4], Ikuhiko Nakase[1,2], Shiho Tokonami[2,3], Takuya Iida[1,2] (1. Grad. Sch. Sci., Osaka Pref. Univ. (Japan), 2. Res. Inst. for Light-induced Acceleration System (RILACS), Osaka Pref. Univ. (Japan), 3. Grad. Sch. Eng., Osaka Pref. Univ. (Japan), 4. Grad. Sch. Eng. Sci., Osaka Univ. (Japan))
10:00 AM - 10:15 AM

9:00 AM - 9:30 AM (Tue. Aug 2, 2022 9:00 AM - 10:15 AM Room 201&202)

[CTuA15C-01 (Invited(P))] High-speed Live-cell Vibrational Imaging with a Mid-infrared Photothermal Quantitative Phase Microscope

[Presentation Style] Onsite

*Genki Ishigane[1], Keiichiro Toda[1], Miu Tamamitsu[1], Hiroyuki Shimada[2], Takuro Ideguchi[1,2] (1. Department of Physics, The University of Tokyo (Japan), 2. Institute for Photon Science and Technology, The University of Tokyo (Japan))

[Presentation Style] Onsite

We demonstrate high-speed live-cell imaging at 50 frames/s with a mid-infrared photothermal quantitative phase microscope by implementing nanosecond pulsed lasers and a high-full-well-capacity image sensor.

9:30 AM - 9:45 AM (Tue. Aug 2, 2022 9:00 AM - 10:15 AM Room 201&202)

[CTuA15C-02] Heat-mediated optical manipulation of Janus particle energized by photonic nanojet

[Presentation Style] Online

*Yuxuan Ren[1], Huade Mao[2], Cihang Kong[1], Bo Li[1], Kenneth K. Y. Wong[2] (1. Fudan University (China), 2. Hong Kong University (Hong Kong))

[Presentation Style] Online

We report on the generation of wavelength-dependent photonic nanojet (PNJ) with plasmonic Janus particle. Such PNJ would produce heat and mediate the backaction force on the Janus particle for biophotonic applications.

9:45 AM - 10:00 AM (Tue. Aug 2, 2022 9:00 AM - 10:15 AM Room 201&202)

[CTuA15C-03] Single-Neuron Stimulation with a Focused Femtosecond Laser

[Presentation Style] Onsite

*Yumi Segawa[1], Wataru Minoshima[1], Kyoko Masui[1], Chie Hosokawa[1] (1. Osaka City Univ. (Japan))

[Presentation Style] Onsite

The less invasive stimulation of neurons at the single-cell level was demonstrated with a focused femtosecond laser. The evoked neuronal activity by the laser irradiation was evaluated by simultaneous fluorescent Ca^{2+} imaging and electrophysiological recordings.

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:00 AM - 10:15 AM Room 201&202)

[CTuA15C-04] Sensitive Detection of Biological Nanoparticles by

Controlled Optical Force in Microflow

[Presentation Style] Onsite

*Kana Fujiwara[1,2,3], Yumiko Takagi[1,2], Mamoru Tamura[2,4], Ikuhiko Nakase[1,2], Shiho Tokonami[2,3], Takuya Iida[1,2]
（1. Grad. Sch. Sci., Osaka Pref. Univ. (Japan), 2. Res. Inst. for Light-induced Acceleration System (RILACS), Osaka Pref. Univ. (Japan), 3. Grad. Sch. Eng., Osaka Pref. Univ. (Japan), 4. Grad. Sch. Eng. Sci., Osaka Univ. (Japan)）

[Presentation Style] Onsite

We succeeded in sensitive detection of biological nanoparticles by optical condensation in microflow system. Furthermore, we revealed that the detection range of biological nanoparticles can be controlled by changing the action range of optical force.

Scattering and Diffuse Reflectance

Session Chair: Masato Ohmi (Osaka Univ.)

Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 201&202 (2F)

[CTuA15D-01 (Invited)] Transcutaneous monitoring of hemoglobin derivatives using camera-based diffuse reflectance spectroscopy
[Presentation Style] Onsite

*Izumi Nishidate[1] （1. Tokyo University of Agriculture and Technology (Japan)）

11:00 AM - 11:30 AM

[CTuA15D-02] Cancer detection with depth resolution using scattering of circularly polarized light
[Presentation Style] Onsite

*Nozomi Nishizawa[1], Bassam Al- Qadi[2], Takahiro Kuchimaru[3] （1. Tokyo Inst. of Tech. (Japan), 2. Palestine Tech.l Univ. (Palestine), 3. Jiichi Med. Univ. (Japan)）

11:30 AM - 11:45 AM

[CTuA15D-03] Widefield Heterodyne Optical Coherence Microscopy for Volumetric Vibration Imaging
[Presentation Style] Online

*Samuel Choi[1,4], Kaito Yoshimizu[1], Takeru Ota[2], Fumiaki Nin[3], Hibino Hiroshi[2,4], Shogo Muramatsu[1], Takamasa Suzuki[1] （1. Niigata Univ. (Japan), 2. Osaka Univ. (Japan), 3. Gifu Univ. (Japan), 4. AMED-CREST, AMED (Japan)）

11:45 AM - 12:00 PM

11:00 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 201&202)

[CTuA15D-01 (Invited)] Transcutaneous monitoring of hemoglobin derivatives using camera-based diffuse reflectance spectroscopy [Presentation Style] Onsite

*Izumi Nishidate[1] (1. Tokyo University of Agriculture and Technology (Japan))

[Presentation Style] Onsite

This paper describes a simple and affordable imaging technique to evaluate transcutaneously hemoglobin derivatives including methemoglobin and multiple physiological parameters such as heart rate, respiratory rate, and hemoglobin oxygen saturation using a digital red-green-blue camera.

11:30 AM - 11:45 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 201&202)

[CTuA15D-02] Cancer detection with depth resolution using scattering of circularly polarized light [Presentation Style] Onsite

*Nozomi Nishizawa[1], Bassam Al- Qadi[2], Takahiro Kuchimaru[3] (1. Tokyo Inst. of Tech. (Japan), 2. Palestine Tech.l Univ. (Palestine), 3. Jiichi Med. Univ. (Japan))

[Presentation Style] Onsite

Depolarization of circularly polarized light scattered from biological tissues provides valuable information for detecting cancer. We have studied the CPL scattering technique from both aspects of experimental and computational studies.

11:45 AM - 12:00 PM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Room 201&202)

[CTuA15D-03] Widefield Heterodyne Optical Coherence Microscopy for Volumetric Vibration Imaging [Presentation Style] Online

*Samuel Choi[1,4], Kaito Yoshimizu[1], Takeru Ota[2], Fumiaki Nin[3], Hibino Hiroshi[2,4], Shogo Muramatsu[1], Takamasa Suzuki[1] (1. Niigata Univ. (Japan), 2. Osaka Univ. (Japan), 3. Gifu Univ. (Japan), 4. AMED-CREST, AMED (Japan))

[Presentation Style] Online

A simultaneous tomographic vibration visualization technique of an entire volume using a scanning low-coherence interferometric microscope was proposed. This technique demonstrated to be valuable for rapid vibration localization and characterization of in-vivo biological tomography.

Plasmonics and Metamaterials for Sensing Applications

Session Chair: Takuo Tanaka (RIKEN)

Tue. Aug 2, 2022 9:30 AM - 10:30 AM Small Hall (2F)

[CTuA16C-02] Polymer-Stabilized Silver Nanoparticles for Plasmonic Fluorescence Biosensing

[Presentation Style] Onsite

*Ryo Kato[1,2], Mitsuhiro Uesugi[3], Yoshie Komatsu[3], Fusatoshi Okamoto[3], Takuo Tanaka[2,1], Fumihisa Kitawaki[3], Taka-aki Yano[1,2] (1. Tokushima University (Japan), 2. RIKEN (Japan), 3. PHC Corporation (Japan))

9:30 AM - 9:45 AM

[CTuA16C-03] Ultrasensitive Gas Refractive Index Measurement with Plasmonic Phase Spectroscopy using Frequency Comb

[Presentation Style] Onsite

*Anh Duy Nguyen[1], GeonHo Lee[1], DongChel Shin[1], SeungWoo Kim[1], YoungJin Kim[1] (1. Korea Advanced Institute of Science and Technology (KAIST) (Korea))

9:45 AM - 10:00 AM

[CTuA16C-04] Plasmon Nanofocusing in Broadband Frequency

[Presentation Style] Onsite

*Takayuki Umakoshi[1], Koki Taguchi[1], Prabhat Verma[1] (1. Osaka Univ. (Japan))

10:00 AM - 10:15 AM

[CTuA16C-05] Quantitative Evaluation of Raman Scattering Intensity Enhanced by Propagating Surface Plasmon Resonance

[Presentation Style] Onsite

*Koichi Honda[1,2], Hidekazu Ishitobi[1,2], Yasushi Inouye[1,2] (1. Osaka Univ. (Japan), 2. AIST PhotoBIO-OIL (Japan))

10:15 AM - 10:30 AM

9:30 AM - 9:45 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Small Hall)

[CTuA16C-02] Polymer-Stabilized Silver Nanoparticles for Plasmonic Fluorescence Biosensing [Presentation Style] Onsite

*Ryo Kato[1,2], Mitsuhiro Uesugi[3], Yoshie Komatsu[3], Fusatoshi Okamoto[3], Takuo Tanaka[2,1], Fumihisa Kitawaki[3], Taka-aki Yano[1,2] (1. Tokushima University (Japan), 2. RIKEN (Japan), 3. PHC Corporation (Japan))

[Presentation Style] Onsite

We developed novel polymer layers to facilely coat plasmonic metal nanoparticles to obtain strong net fluorescence intensity and employed the polymer-coated silver nanoparticles for highly sensitive biosensing based on plasmon-enhanced fluorescence.

9:45 AM - 10:00 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Small Hall)

[CTuA16C-03] Ultrasensitive Gas Refractive Index Measurement with Plasmonic Phase Spectroscopy using Frequency Comb [Presentation Style] Onsite

*Anh Duy Nguyen[1], GeonHo Lee[1], DongChel Shin[1], SeungWoo Kim[1], YoungJin Kim[1] (1. Korea Advanced Institute of Science and Technology (KAIST) (Korea))

[Presentation Style] Onsite

Phase-sensitivity plasmonic sensor has not been much explored because of the lack of a stable light source. Here, we demonstrate that frequency-comb-referenced plasmonic phase spectroscopy can be used for ultrasensitive gas refractive index measurement

10:00 AM - 10:15 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Small Hall)

[CTuA16C-04] Plasmon Nanofocusing in Broadband Frequency [Presentation Style] Onsite

*Takayuki Umakoshi[1], Koki Taguchi[1], Prabhat Verma[1] (1. Osaka Univ. (Japan))

[Presentation Style] Onsite

In this study, we have shown that plasmon nanofocusing technique enables to generate a nanolight source that spans over extremely wide frequency range from the whole visible to near-infrared regions.

10:15 AM - 10:30 AM (Tue. Aug 2, 2022 9:30 AM - 10:30 AM Small Hall)

[CTuA16C-05] Quantitative Evaluation of Raman Scattering Intensity Enhanced by Propagating Surface Plasmon Resonance [Presentation Style] Onsite

*Koichi Honda[1,2], Hidekazu Ishitobi[1,2], Yasushi Inouye[1,2] （1. Osaka Univ. (Japan), 2. AIST PhotoBIO-OIL (Japan)）

[Presentation Style] Onsite

The incident angle dependence of Raman scattering intensity of Rhodamine 6G enhanced by propagating surface plasmon resonance was quantitatively evaluated, and the dependence was found to be in good agreement with electromagnetic field analysis.

Optical Trapping and Photon Manipulation

Session Chair: Kosei Ueno (Hokkaido Univ.)

Tue. Aug 2, 2022 11:00 AM - 12:00 PM Small Hall (2F)

[CTuA16D-01] Light powered nanomotors and control of light momentum via engineering localized plasmon resonances

[Presentation Style] Online

*Yoshito Y. Tanaka[1], Tsutomu Shimura[1] (1. Institute of Industrial Science, The University of Tokyo (Japan))

11:00 AM - 11:15 AM

[CTuA16D-02] Analysis of angular momentum transfer from photon to multimer nanoantenna

[Presentation Style] Onsite

*Yuji Sunaba[1], Keiji Sasaki[1] (1. Hokkaido Univ. (Japan))

11:15 AM - 11:30 AM

[CTuA16D-03] Trapping of poly (N-isopropylacrylamide) by optical tweezers using silver plasmon

[Presentation Style] Onsite

*Maho Nishiguchi[1], Maho Kubota[1], Ken-ichi Yuyama[1], Yoshiki Nakata[2], Yasuyuki Tsuboi[1] (1. Osaka City University (Japan), 2. Osaka University (Japan))

11:30 AM - 11:45 AM

[CTuA16D-04] Development of Three-dimensional Arbitrary Optical Condensation Method with Fiber-based Module

[Presentation Style] Onsite

*Kota Hayashi[1,2,3], Mamoru Tamura[2,4], Masazumi Fujiwara[2,5], Shiho Tokonami[2,3], Takuya Iida[1,2] (1. Grad. Sch. Sci. in Osaka Pref. Uni. (Japan), 2. RILACS in Osaka Pref. Univ. (Japan), 3. Grad. Sch. Eng. in Osaka Pref. Univ. (Japan), 4. Grad. Sch. Eng. Sci. in Osaka Univ. (Japan), 5. Grad. Sch. Nat. Sci. Tech. in Okayama Univ. (Japan))

11:45 AM - 12:00 PM

11:00 AM - 11:15 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Small Hall)

[CTuA16D-01] Light powered nanomotors and control of light momentum via engineering localized plasmon resonances
[Presentation Style] Online

*Yoshito Y. Tanaka[1], Tsutomu Shimura[1] (1. Institute of Industrial Science, The University of Tokyo (Japan))

[Presentation Style] Online

We demonstrate a linear nanomotor using lateral optical force due to directional side scattering by a plasmonic nanoparticle. We also propose the nanomotors with different functions, direction-controllable nanomotor and nonlinear optical nanomotor.

11:15 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Small Hall)

[CTuA16D-02] Analysis of angular momentum transfer from photon to multimer nanoantenna
[Presentation Style] Onsite

*Yuji Sunaba[1], Keiji Sasaki[1] (1. Hokkaido Univ. (Japan))

[Presentation Style] Onsite

We numerically analyzed the localized plasmonic field. In this paper, we show the mechanism of angular momentum transfer from photon to the plasmonic nanoantenna in terms of nano scale energy flux and electric field distribution.

11:30 AM - 11:45 AM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Small Hall)

[CTuA16D-03] Trapping of poly (N-isopropylacrylamide) by optical tweezers using silver plasmon
[Presentation Style] Onsite

*Maho Nishiguchi[1], Maho Kubota[1], Ken-ichi Yuyama[1], Yoshiki Nakata[2], Yasuyuki Tsuboi[1] (1. Osaka City University (Japan), 2. Osaka University (Japan))

[Presentation Style] Onsite

We trapped a water-soluble chain polymer by silver plasmonic optical tweezers. Three types of silver plasmonic nanostructures were examined as substrate that silver plasmonic optical tweezers are a powerful tool for manipulation of nanomaterials.

11:45 AM - 12:00 PM (Tue. Aug 2, 2022 11:00 AM - 12:00 PM Small Hall)

[CTuA16D-04] Development of Three-dimensional Arbitrary Optical Condensation Method with Fiber-based Module

[Presentation Style] Onsite

*Kota Hayashi[1,2,3], Mamoru Tamura[2,4], Masazumi Fujiwara[2,5], Shiho Tokonami[2,3], Takuya Iida[1,2] (1. Grad. Sch. Sci. in Osaka Pref. Uni. (Japan), 2. RILACS in Osaka Pref. Univ. (Japan), 3. Grad. Sch. Eng. in Osaka Pref. Univ. (Japan), 4. Grad. Sch. Eng. Sci. in Osaka Univ. (Japan), 5. Grad. Sch. Nat. Sci. Tech. in Okayama Univ. (Japan))

[Presentation Style] Onsite

We developed photothermal fiber-based module coated with metallic nanofilm to demonstrate optical condensation at Three-dimensionally arbitrary positions. By using this module, the assembly efficiency was improved about twenty times in comparison with the conventional method.

Microwave Signal Generation

Session Chairs: Joonyoung Kim (Sangmyung Univ.), Atsushi Kanno (NICT)

Tue. Aug 2, 2022 11:00 AM - 11:45 AM Mid-sized Hall B (1F)

[CTuA18C-01 (Invited(P))] Injection-Locked Optoelectronic Oscillator for Phase Noise Purification in 100-GHz Bands

[Presentation Style] Onsite

*Atsushi Kanno[1], Pham Tien Dat[1] （1. National Institute of Information and Communications Technology (Japan)）

11:00 AM - 11:30 AM

[CTuA18C-02] High-frequency microwave generation using period-one dynamics of two mutually coupled semiconductor lasers

[Presentation Style] Online

*Chin-Hao Tseng[1], Bin-Kai Liao[1], Sheng-Kwang Hwang[1,2] （1. Department of Photonics, National Cheng Kung University (Taiwan), 2. Advanced Optoelectronic Technology Center, National Cheng Kung University (Taiwan)）

11:30 AM - 11:45 AM

11:00 AM - 11:30 AM (Tue. Aug 2, 2022 11:00 AM - 11:45 AM Mid-sized Hall B)

[CTuA18C-01 (Invited(P))] Injection-Locked Optoelectronic Oscillator for Phase Noise Purification in 100-GHz Bands [Presentation Style] Onsite

*Atsushi Kanno[1], Pham Tien Dat[1] (1. National Institute of Information and Communications Technology (Japan))

[Presentation Style] Onsite

Injection-locked optoelectronic oscillator operated in the 100-GHz band is configured and evaluated. High-speed modulator and photodiode realize W-band fundamental oscillation, and resultant phase noise is improved 10 dB at an offset frequency of 10 kHz.

11:30 AM - 11:45 AM (Tue. Aug 2, 2022 11:00 AM - 11:45 AM Mid-sized Hall B)

[CTuA18C-02] High-frequency microwave generation using period-one dynamics of two mutually coupled semiconductor lasers [Presentation Style] Online

*Chin-Hao Tseng[1], Bin-Kai Liao[1], Sheng-Kwang Hwang[1,2] (1. Department of Photonics, National Cheng Kung University (Taiwan), 2. Advanced Optoelectronic Technology Center, National Cheng Kung University (Taiwan))

[Presentation Style] Online

We propose a novel photonic approach for microwave generation based on two mutually coupled semiconductor lasers. A 55-GHz microwave with a 3-dB linewidth below 3.6 kHz and a side-peak-suppression ratio of 45 dB is achieved.

Oral Session | CLEO-PR2022 | High Power Fiber Amplifier

High Power Fiber Amplifier

Session Chairs: Wei Shi (Tianjin Univ.), Akira Shirakawa (UEC)

Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall B (1F)

[CTuP1C-01 (Invited(P))] Flexible Wavelength Shifting of Ultrafast Lasers at High Power Levels

[Presentation Style] Onsite

*Henrik Tuennermann[1], Prannay Balla[1,2,3], Sarper H Salman[1,2,3], Mingqi Fan[1,2,3], Mindaugas Mecejus[1], Ingmar Hartl[1], Christoph M. Heyl[1,2,3] (1. Deutsches Elektronen-Synchrotron DESY (Germany), 2. Helmholtz-Institute Jena (Germany), 3. GSI Helmholtzzentrum fur Schwerionenforschnung GmbH (Germany))

1:30 PM - 2:00 PM

[CTuP1C-02] Suppression of stimulated Brillouin scattering in multimode fiber via adjusting the input wavefront

[Presentation Style] Onsite

*Linh Viet Nguyen[1], Stephen Warren-Smith[1], Ori Henderson-Sapir[2], Heike Ebendorff-Heidepriem[2], David Ottoway[2], Erik Schartner[2], Chun-Wei Chen[3], Kabish Wisal[3], Douglas A. Stone[3] (1. University of South Australia (Australia), 2. The University of Adelaide (Australia), 3. Yale University (United States of America))

2:00 PM - 2:15 PM

[CTuP1C-03] Pre-chirper Free Nonlinear Fiber Amplifier Generating Tunable Picosecond Pulses For Coherent Anti-Stokes Raman Imaging

[Presentation Style] Online

Jiaying Li[1], Jiamei Wu[1], *Kangwen Yang[1], Qiang Hao[1], Minbiao Ji[2], Ming Yan[3,4], Kun Huang[3,4], Heping Zeng[1,3,4,5] (1. University of Shanghai for Science and Technology (China), 2. Fudan University (China), 3. East China Normal University (China), 4. Chongqing Institute of East China Normal University (China), 5. Jinan Institute of Quantum Technology (China))

2:15 PM - 2:30 PM

[CTuP1C-04] High Power Mode Instability in Fiber Amplifiers Employing Double-side Spiral Coiling Configuration

[Presentation Style] Online

*Rumao Tao[1] (1. Laser Fusion Research Center (China))

2:30 PM - 2:45 PM

[CTuP1C-05] Phase Modulated Frequency Comb Seed Source for High Power Spectral Beam Combining

[Presentation Style] Onsite

*Shilpi Arora[1], Lakshmi C.G.[1], B.S. Vikram[1], V.R. Supradeepa[1] (1. Indian Institute of Science (India))

2:45 PM - 3:00 PM

1:30 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall B)

[CTuP1C-01 (Invited(P))] Flexible Wavelength Shifting of Ultrafast Lasers at High Power Levels
[Presentation Style] Onsite

*Henrik Tuennermann[1], Prannay Balla[1,2,3], Sarper H Salman[1,2,3], Mingqi Fan[1,2,3], Mindaugas Mecejus[1], Ingmar Hartl[1], Christoph M. Heyl[1,2,3] (1. Deutsches Elektronen-Synchrotron DESY (Germany), 2. Helmholtz-Institute Jena (Germany), 3. GSI Helmholtzzentrum fur Schwerionenforschnung GmbH (Germany))

[Presentation Style] Onsite

We present a wavelength shifting method suitable for high power lasers. We demonstrate our concept via simulations and experimentally shift an 80 W, 200 fs laser at 1030 nm by ±30 nm.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall B)

[CTuP1C-02] Suppression of stimulated Brillouin scattering in multimode fiber via adjusting the input wavefront
[Presentation Style] Onsite

*Linh Viet Nguyen[1], Stephen Warren-Smith[1], Ori Henderson-Sapir[2], Heike Ebendorff-Heidepriem[2], David Ottoway[2], Erik Schartner[2], Chun-Wei Chen[3], Kabish Wisal[3], Douglas A. Stone[3] (1. University of South Australia (Australia), 2. The University of Adelaide (Australia), 3. Yale University (United States of America))

[Presentation Style] Onsite

Stimulated Brillouin scattering (SBS) induced by narrow-linewidth high power pulses in a multimode fiber (MMF) is suppressed via controlling the input wavefront, presenting a new route to scaling power in high power fiber amplifiers.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall B)

[CTuP1C-03] Pre-chirper Free Nonlinear Fiber Amplifier Generating Tunable Picosecond Pulses For Coherent Anti-Stokes Raman Imaging
[Presentation Style] Online

Jiaying Li[1], Jiamei Wu[1], *Kangwen Yang[1], Qiang Hao[1], Minbiao Ji[2], Ming Yan[3,4], Kun Huang[3,4], Heping Zeng[1,3,4,5] (1. University of Shanghai for Science and Technology (China), 2. Fudan University (China), 3. East China Normal University (China), 4. Chongqing Institute of East China Normal University (China), 5. Jinan Institute of Quantum Technology (China))

[Presentation Style] Online

A pre-chirper free, core-pumped nonlinear fiber amplifier was demonstrated to generate parabolic pulse with spectral bandwidth of 53 nm, these pulses were filtered and passively synchronized for conducting coherent anti-Stokes Raman imaging.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall B)

[CTuP1C-04] High Power Mode Instability in Fiber Amplifiers Employing Double-side Spiral Coiling Configuration
[Presentation Style] Online

*Rumao Tao[1] (1. Laser Fusion Research Center (China))

[Presentation Style] Online

Mode instability of fiber amplifiers employing double-side spiral coiling configurations has been analyzed numerically for the first time, which reveals that, compared with those employing traditional spiral coiling configurations, fiber amplifiers with double-side spiral coiling configurations have much higher mode instability threshold.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall B)

[CTuP1C-05] Phase Modulated Frequency Comb Seed Source for High Power Spectral Beam Combining
[Presentation Style] Onsite

*Shilpi Arora[1], Lakshmi C.G.[1], B.S. Vikram[1], V.R. Supradeepa[1] (1. Indian Institute of Science (India))

[Presentation Style] Onsite

We have demonstrated a seed laser architecture that can be used for spectral beam combining to generate high output powers from a single laser. The proposed method reduces stimulated Brillouin scattering through line shape control.

Oral Session | CLEO-PR2022 | Fiber Lasers

Fiber Lasers

Session Chairs: Sze Yun Set (Univ. of Tokyo), Norihiko Nishizawa (Nagoya Univ.)

Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B (1F)

[CTuP1D-01] Single-polarization Single-frequency Brillouin Fiber Laser Emits Near 5-W Power at 1 μ m

[Presentation Style] Online

*Yue Tao[1], Man Jiang[1], Liu Liu[1], Can Li[1], Pu Zhou[1], Zongfu Jiang[1] (1. National University of Defense Technology (China))

3:30 PM - 3:45 PM

[CTuP1D-02] Pulsed Cascaded Raman Fiber Laser with Wide Wavelength Tunability

[Presentation Style] Onsite

*Abhigyan Goswami[1], Sarthak Dash[1], Rashmita Deheri[1], S. Arun[1], V.R. Supradeepa[1] (1. Indian Institute of Science (India))

3:45 PM - 4:00 PM

[CTuP1D-03] Cascaded Raman fiber lasers pumped with narrow linewidth, low intensity noise sources

[Presentation Style] Onsite

*RASHMITA DEHERI[1], Sarthak Dash[1], V.R. Supradeepa[1], V. Balaswamy[1] (1. Indian Institute of Science, Bengaluru (India))

4:00 PM - 4:15 PM

[CTuP1D-04] 2.1 μ m Fiber Gas Raman Laser Source based on Deuterium-filled Hollow-core Photonic Crystal Fibers

[Presentation Style] Online

*Ziyan Li[1], Wenxi Pei[1], Hao Li[1], Wei Huang[1], Meng Wang[1], Zefeng Wang[1] (1. The National University of Defense Technology (China))

4:15 PM - 4:30 PM

[CTuP1D-05] Achieving high pulse purity in spectrally-sliced supercontinuum pumped by ultrafast fiber lasers

[Presentation Style] Online

Shiyu Zhu[1], Jiahe Li[1], Ruihong Dai[1], *Fengqiu Wang[1] (1. Nanjing University (China))

4:30 PM - 4:45 PM

[CTuP1D-06] Mode-locking of an Erbium-doped fiber laser using a Ti_2AlN based saturable absorber

[Presentation Style] Online

*Suh-young Kwon[1], Jinho Lee[1], Ju Han Lee[1] (1. Univ. of Seoul (Korea))

4:45 PM - 5:00 PM

[CTuP1D-07] Fiber Microcavity Lasers with Complex Lasing

*jinchuan zhang[1], hongyang zhu[1], mingzhu she[1], weili zhang[1] (1. university of electronic science and technology of China (China))

5:00 PM - 5:15 PM

3:30 PM - 3:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-01] Single-polarization Single-frequency Brillouin Fiber Laser Emits Near 5-W Power at 1 μm

[Presentation Style] Online

*Yue Tao[1], Man Jiang[1], Liu Liu[1], Can Li[1], Pu Zhou[1], Zongfu Jiang[1] (1. National University of Defense Technology (China))

[Presentation Style] Online

A 4.9 W single-polarization single-frequency 1064 nm Brillouin fiber laser that constructed with 20/400 polarization-maintaining germanium-doped fiber is demonstrated, which is the highest power that outputs from a single-frequency fiber laser.

3:45 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-02] Pulsed Cascaded Raman Fiber Laser with Wide Wavelength Tunability

[Presentation Style] Onsite

*Abhigyan Goswami[1], Sarthak Dash[1], Rashmita Deheri[1], S. Arun[1], V.R. Supradeepa[1] (1. Indian Institute of Science (India))

[Presentation Style] Onsite

Tunable self Q-switched Ytterbium pump and spectral filtering of Raman stokes is used to generate pulsed output at wavelengths spanning 1100nm-1600nm having pulse width ~150ns with ~40kHz repetition rate and peak powers greater than ~20W.

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-03] Cascaded Raman fiber lasers pumped with narrow linewidth, low intensity noise sources

[Presentation Style] Onsite

*RASHMITA DEHERI[1], Sarthak Dash[1], V.R. Supradeepa[1], V. Balaswamy[1] (1. Indian Institute of Science, Bengaluru (India))

[Presentation Style] Onsite

We demonstrate a cascaded Raman fiber laser with low intensity noise (<-104dBc/Hz, from 9kHz to 10GHz) and ~99% spectral purity tunable over 6 Stokes orders, by using very low intensity noise, narrow linewidth pump source.

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-04] 2.1 μm Fiber Gas Raman Laser Source based on Deuterium-filled Hollow-core Photonic Crystal Fibers

[Presentation Style] Online

*Ziyan Li[1], Wenxi Pei[1], Hao Li[1], Wei Huang[1], Meng Wang[1], Zefeng Wang[1] （1. The National University of Defense Technology (China)）

[Presentation Style] Online

We report a watt-level fiber gas Raman laser source at 2.1 μm based on deuterium-filled hollow-core photonic crystal fibers (HC-PCFs). The maximum Raman power of 1.1 W is obtained; the corresponding conversion efficiency is 25.3%.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-05] Achieving high pulse purity in spectrally-sliced supercontinuum pumped by ultrafast fiber lasers

[Presentation Style] Online

Shiyu Zhu[1], Jiahe Li[1], Ruihong Dai[1], *Fengqiu Wang[1] （1. Nanjing University (China)）

[Presentation Style] Online

We compare the temporal purity of pulses from filter-sliced supercontinuum and found pulses generated by a picosecond pump exhibit appreciably better quality than a femtosecond pump, yielding new insights for designing practical ultrafast wavelength-tunable supercontinuum.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-06] Mode-locking of an Erbium-doped fiber laser using a Ti_2AlN based saturable absorber

[Presentation Style] Online

*Suh-young Kwon[1], Jinho Lee[1], Ju Han Lee[1] （1. Univ. of Seoul (Korea)）

[Presentation Style] Online

The feasibility of using MAX phase Ti_2AlN for fiber laser mode-locking at 1.5-μm wavelengths was investigated. Our Ti_2AlN-based saturable absorber with a ~7% modulation depth was successfully used for generation of ~4.62-ps pulses.

5:00 PM - 5:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Mid-sized Hall B)

[CTuP1D-07] Fiber Microcavity Lasers with Complex Lasing

*jinchuan zhang[1], hongyang zhu[1], mingzhu she[1], weili zhang[1] （1. university of electronic science and technology of China (China)）

A fiber microcavity laser with multi-mechanism emission is proposed. Due to boundary effect of cavity and scattering of the gain medium, different mechanisms of lasing can be obtained by changing cavity length and pump position.

Oral Session | CLEO-PR2022 | THz Spectroscopy

THz Spectroscopy

Session Chair: Hiroaki Minamide (RIKEN)

Tue. Aug 2, 2022 1:30 PM - 2:45 PM Room 201&202 (2F)

[CTuP3C-01] Terahertz Time-Domain Spectroscopy using Chirped-Pulse Up-Conversion with Dispersion Compensation

[Presentation Style] Onsite

*Ryo Tamaki[1,2], Masashi Suzuki[2], Jun Takeda[2], Ikufumi Katayama[2] （1. KISTEC (Japan), 2. Yokohama Natl. Univ. (Japan)）

1:30 PM - 1:45 PM

[CTuP3C-02] Development of Terahertz Time-Domain Rotating-Analyzer Ellipsometry

[Presentation Style] Onsite

Verdad Agulto[1], Toshiyuki Iwamoto[2], Valynn Mag-usara[1], *MAKOTO NAKAJIMA[1] （1. Osaka University (Japan), 2. Nippo Precision (Japan)）

1:45 PM - 2:00 PM

[CTuP3C-03] Interlayer Phonon Modes of $MoSe_2$ and WSe_2 Observed by THz Emission Spectroscopy

[Presentation Style] Online

*Jessica C. Afalla[1], Joselito E. Muldera[2], Semmi Takamizawa[1], Takumi Fukuda[1], Keiji Ueno[3], Masahiko Tani[2], Muneaki Hase[1] （1. Univ. Tsukuba (Japan), 2. Univ. Fukui (Japan), 3. Saitama Univ. (Japan)）

2:00 PM - 2:15 PM

[CTuP3C-04] Ultrabroadband infrared coherent spectroscopy using solids as nonlinear media

*Eiichi Matsubara[1,2], Masaaki Ashida[2] （1. National Inst. of Tech., Asahikawa College (Japan), 2. Osaka Univ. (Japan)）

2:15 PM - 2:30 PM

[CTuP3C-05] Discussion on optical parameters of quartz crystal in the terahertz frequency

[Presentation Style] Onsite

*Kei Takeya[1,2], Hideki Ishizuki[1,2], Takunori Taira[1,2] （1. Institute for Molecular Science (Japan), 2. RIKEN (Japan)）

2:30 PM - 2:45 PM

1:30 PM - 1:45 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Room 201&202)

[CTuP3C-01] Terahertz Time-Domain Spectroscopy using Chirped-Pulse Up-Conversion with Dispersion Compensation

[Presentation Style] Onsite

*Ryo Tamaki[1,2], Masashi Suzuki[2], Jun Takeda[2], Ikufumi Katayama[2] (1. KISTEC (Japan), 2. Yokohama Natl. Univ. (Japan))

[Presentation Style] Onsite

Chirped-pulse up-conversion was applied to detect an accurate terahertz waveform. The waveform distortion was suppressed by using dispersion compensation via the chirped-pulse up-conversion, providing a scheme for terahertz time-domain spectroscopy on a single-shot basis.

1:45 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Room 201&202)

[CTuP3C-02] Development of Terahertz Time-Domain Rotating-Analyzer Ellipsometry

[Presentation Style] Onsite

Verdad Agulto[1], Toshiyuki Iwamoto[2], Valynn Mag-usara[1], *MAKOTO NAKAJIMA[1] (1. Osaka University (Japan), 2. Nippo Precision (Japan))

[Presentation Style] Onsite

High-precision terahertz (THz) time-domain ellipsometry is developed. The rotating-analyzer technique is newly applied through phase component correction based on the analysis of the THz field amplitude as a function of analyzer angle.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Room 201&202)

[CTuP3C-03] Interlayer Phonon Modes of $MoSe_2$ and WSe_2 Observed by THz Emission Spectroscopy

[Presentation Style] Online

*Jessica C. Afalla[1], Joselito E. Muldera[2], Semmi Takamizawa[1], Takumi Fukuda[1], Keiji Ueno[3], Masahiko Tani[2], Muneaki Hase[1] (1. Univ. Tsukuba (Japan), 2. Univ. Fukui (Japan), 3. Saitama Univ. (Japan))

[Presentation Style] Online

Terahertz time domain emission spectroscopy was performed on bulk $MoSe_2$ and WSe_2. Results show THz signals comprising of a single cycle transient current-driven signal and oscillatory signals from coherent phonons attributed to interlayer vibrational modes.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Room 201&202)

[CTuP3C-04] Ultrabroadband infrared coherent spectroscopy using solids as nonlinear media

*Eiichi Matsubara[1,2], Masaaki Ashida[2] (1. National Inst. of Tech., Asahikawa College (Japan), 2. Osaka Univ. (Japan))

The use of multiple thin fused-silica plates for pulse compression and that of a single crystal of diamond for detection have been found to contribute to the efficient and stable ultrabroadband infrared coherent spectroscopy.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Room 201&202)

[CTuP3C-05] Discussion on optical parameters of quartz crystal in the terahertz frequency

[Presentation Style] Onsite

*Kei Takeya[1,2], Hideki Ishizuki[1,2], Takunori Taira[1,2] (1. Institute for Molecular Science (Japan), 2. RIKEN (Japan))

[Presentation Style] Onsite

Quartz crystals with different geometries and impurity concentrations were analyzed by terahertz time-domain spectroscopy in order to discuss the optical parameters of quartz crystals in detail.

Oral Session | CLEO-PR2022 | THz Detection, Sensing, and Manipulation

THz Detection, Sensing, and Manipulation

Session Chair: Takeshi Yasui (Tokushima Univ.)

Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202 (2F)

[CTuP3D-01 (Invited)] Recent Progress in Terahertz Quantum Sensing
[Presentation Style] Online

Mirco Kutas[1,2], Björn E Haase[1,2], Felix Riexinger[1,2], Joshua Hennig[1,2], Tobias Pfeiffer[1,2], Daniel Molter[1,2], *Georg von Freymann[1,2] (1. Fraunhofer Institute for Industrial Mathematics ITWM (Germany), 2. Technische Univ. Kaiserslautern (Germany))

3:30 PM - 4:00 PM

[CTuP3D-02] Single-shot Detection of Terahertz Radiation Waveform Emitted from Femtosecond Laser Ablation
[Presentation Style] Onsite

Ryo Tamaki[1,2], Tatsuki Kasai[1], Gaku Asai[3], Daiki Hata[3], Hajime Kubo[3], Yuichi Takigawa[3], Jun Takeda[1], *Ikufumi Katayama[1] (1. Yokohama Natl. Univ. (Japan), 2. KISTEC (Japan), 3. Nikon Corp. (Japan))

4:00 PM - 4:15 PM

[CTuP3D-03] Alignment-Insensitive THz-OAM Wave Generator Based on Square Lattice Photonic Crystal
[Presentation Style] Onsite

*Remma Hata[1], Hiroki Kishikawa[1], Junichi Fujikata[1] (1. Tokushima Univ. (Japan))

4:15 PM - 4:30 PM

[CTuP3D-04] Profile control of silicon moth-eye structures for terahertz antireflection fabricated by femtosecond laser processing
[Presentation Style] Onsite

*Xi Yu[1], Yuki Yasunaga[2], Kazusa Goto[2], Dejun Liu[3], Makoto Kuwahara[1,4], Shingo Ono[2] (1. IMaSS, Nagoya Univ. (Japan), 2. Dept. Phys. Sci. and Eng., Nitech (Japan), 3. Dept. Phys., Shanghai Normal Univ. (China), 4. Grad. Sch. Eng., Nagoya Univ. (Japan))

4:30 PM - 4:45 PM

[CTuP3D-05] Hybrid moth-eye structure fabricated by laser processing and heat press coating for terahertz antireflection
[Presentation Style] Onsite

*Xi Yu[1], Kazusa Goto[2], Yuki Yasunaga[2], Junshi Soeda[3], Makoto Kuwahara[4], Shingo Ono[2] (1. IMaSS, Nagoya Univ. (Japan), 2. Dept. Phys. Sci. and Eng., Nitech (Japan), 3. Teijin Ltd. (Japan), 4. Grad. Sch. Eng., Nagoya Univ. (Japan))

4:45 PM - 5:00 PM

[CTuP3D-06] Characteristics of Terahertz Notch Filter using Two Monolayer Guided-Mode Resonance Filters
[Presentation Style] Onsite

Hyeon Sang Bark[1], Gyeong-Ryul Kim[2,3], Mun-Won Park[2,3], Kyu-Ha Jang[1], Kitae Lee[1], Young Uk Jeong[1], *Tae-In Jeon[2,3] (1. Radiation Center for Ultrafast

Science, KAER Inst. (Korea), 2. Electrical and Electronics Engineering, KMO Univ. (Korea), 3. Interdisciplinary Major of Maritime AI Convergence, KMO Univ. (Korea))

5:00 PM - 5:15 PM

3:30 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202)

[CTuP3D-01 (Invited)] Recent Progress in Terahertz Quantum Sensing
[Presentation Style] Online

Mirco Kutas[1,2], Björn E Haase[1,2], Felix Riexinger[1,2], Joshua Hennig[1,2], Tobias Pfeiffer[1,2], Daniel Molter[1,2], *Georg von Freymann[1,2] (1. Fraunhofer Institute for Industrial Mathematics ITWM (Germany), 2. Technische Univ. Kaiserslautern (Germany))

[Presentation Style] Online

Terahertz quantum sensing using nonlinear interferometers allows for measuring terahertz spectral properties of samples while only detecting visible light, which never interacted with the sample. We discuss possibilities for terahertz applications in spectroscopy and imaging.

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202)

[CTuP3D-02] Single-shot Detection of Terahertz Radiation Waveform Emitted from Femtosecond Laser Ablation
[Presentation Style] Onsite

Ryo Tamaki[1,2], Tatsuki Kasai[1], Gaku Asai[3], Daiki Hata[3], Hajime Kubo[3], Yuichi Takigawa[3], Jun Takeda[1], *Ikufumi Katayama[1] (1. Yokohama Natl. Univ. (Japan), 2. KISTEC (Japan), 3. Nikon Corp. (Japan))

[Presentation Style] Onsite

Initial charge emission dynamics during femtosecond laser ablation was visualized by detecting the terahertz radiation waveform using a highly sensitive single-shot terahertz spectrometer. Pulse-to-pulse changes of the terahertz waveforms were clearly observed.

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202)

[CTuP3D-03] Alignment-Insensitive THz-OAM Wave Generator Based on Square Lattice Photonic Crystal
[Presentation Style] Onsite

*Remma Hata[1], Hiroki Kishikawa[1], Junichi Fujikata[1] (1. Tokushima Univ. (Japan))

[Presentation Style] Onsite

For orbital angular momentum (OAM) wave generation, high-accuracy beam alignment is usually required. A photonic crystal (PhC)-based OAM wave generator is proposed and analyzed numerically. Very small alignment-dependence can be achieved with high efficiency.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202)

[CTuP3D-04] Profile control of silicon moth-eye structures for terahertz antireflection fabricated by femtosecond laser processing
[Presentation Style] Onsite

*Xi Yu[1], Yuki Yasunaga[2], Kazusa Goto[2], Dejun Liu[3], Makoto Kuwahara[1,4], Shingo Ono[2] （1. IMaSS, Nagoya Univ. (Japan), 2. Dept. Phys. Sci. and Eng., Nitech (Japan), 3. Dept. Phys., Shanghai Normal Univ. (China), 4. Grad. Sch. Eng., Nagoya Univ. (Japan)）

[Presentation Style] Onsite

Micro tapers with different profiles were fabricated by using femtosecond laser processing, and these tapers were employed to constitute moth-eye structures for terahertz frequencies. The relationship between profiles and antireflective performance is quantitatively analyzed.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202)

[CTuP3D-05] Hybrid moth-eye structure fabricated by laser processing and heat press coating for terahertz antireflection [Presentation Style] Onsite

*Xi Yu[1], Kazusa Goto[2], Yuki Yasunaga[2], Junshi Soeda[3], Makoto Kuwahara[4], Shingo Ono[2] （1. IMaSS, Nagoya Univ. (Japan), 2. Dept. Phys. Sci. and Eng., Nitech (Japan), 3. Teijin Ltd. (Japan), 4. Grad. Sch. Eng., Nagoya Univ. (Japan)）

[Presentation Style] Onsite

A hybrid antireflective structure was fabricated by attaching a polymer-based two-layer coating onto a silicon moth-eye structure, whose power reflectance can remain below 6% in a broad range from 0.6 to 2.5 THz.

5:00 PM - 5:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:15 PM Room 201&202)

[CTuP3D-06] Characteristics of Terahertz Notch Filter using Two Monolayer Guided-Mode Resonance Filters [Presentation Style] Onsite

Hyeon Sang Bark[1], Gyeong-Ryul Kim[2,3], Mun-Won Park[2,3], Kyu-Ha Jang[1], Kitae Lee[1], Young Uk Jeong[1], *Tae-In Jeon[2,3] （1. Radiation Center for Ultrafast Science, KAER Inst. (Korea), 2. Electrical and Electronics Engineering, KMO Univ. (Korea), 3. Interdisciplinary Major of Maritime AI Convergence, KMO Univ. (Korea)）

[Presentation Style] Onsite

We present the THz transmission characteristics of a guided-mode resonance (GMR) notch filter made of all-dielectric material. When the polarization angle for the ideal 1-D GMR filter changes from 0˚ to 180˚, the transmittance variation changes from 0 to 1 as a function of $\cos^2(\Phi)$, where Φ is polarization angle. However, if the second filter is installed at a rotation angle between 0˚ and 90˚ compared to the first filter, then the transmittance ranges for the polarization angles change from 0 to any value less than 1.

Oral Session | CLEO-PR2022 | Beam Manipulation and Applications

Beam Manipulation and Applications

Session Chair: Aiko Narazaki (AIST)

Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 206 (2F)

[CTuP5A-01 (Invited)] High depth of field and high speed variable focus for advanced laser processing applications
[Presentation Style] Online

Xiaohan Du[1], Camilo Florian[1], *Craig Arnold[1] (1. Princeton University (United States of America))

1:30 PM - 2:00 PM

[CTuP5A-02] Two-dimensional array of multiple-armed chiral surface reliefs in azo-polymers with rotating petal beams
[Presentation Style] Onsite

*Arata Tomita[1], Adam Vallés[2], Katsuhiko Miyamoto[1], Takashige Omatsu[1] (1. Chiba Univ. (Japan), 2. Institut de Ciencies Fotoniques (Spain))

2:00 PM - 2:15 PM

[CTuP5A-03] Direct print of well-aligned close-packed gold microdots with optical vortex irradiation
[Presentation Style] Onsite

*Kanta Takahashi[1], Haruki Kawaguchi[1], Rong Wei[1], Keisaku Yamane[2], Ken-ichi Yuyama[3], Satoyuki Kawano[4], Ryuji Morita[2], Nobuyuki Aoki[1], Katsuhiko Miyamoto[1], Takashige Omatsu[1] (1. Chiba Univ. (Japan), 2. Hokkaido Univ. (Japan), 3. Osaka City Univ. (Japan), 4. Osaka Univ. (Japan))

2:15 PM - 2:30 PM

[CTuP5A-04] Creation of a Spring-Shaped Microfiber with Optical Vortex
[Presentation Style] Onsite

*Yuto Horiuchi[1], Masataka Shinada[1], Haruki Kawaguchi[1], Katsuhiko Miyamoto[1,2], Yoshihiko Arita[2,3], Takashige Omatsu[1,2] (1. Graduate School of Engineering, Chiba univ. (Japan), 2. MCRC, Chiba univ. (Japan), 3. SUPA, School of Physics and Astronomy, St Andrews univ. (UK))

2:30 PM - 2:45 PM

[CTuP5A-05] A compact optical set-up to create high-order vectorial structured light beams
[Presentation Style] Online

*Praveen Kumar[1], Naveen K. Nishchal[2], Takashige Omatsu[1], A Srinivasa Rao[1] (1. Chiba University (Japan), 2. Indian Institute of Technology Patna (India))

2:45 PM - 3:00 PM

1:30 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 206)

[CTuP5A-01 (Invited)] High depth of field and high speed variable focus for advanced laser processing applications [Presentation Style] Online

Xiaohan Du[1], Camilo Florian[1], *Craig Arnold[1] (1. Princeton University (United States of America))

[Presentation Style] Online

We use an ultrafast varifocal lens to achieve quasi-simultaneous multi-focal laser marking and scribing of transparent materials. Multiple lines located at different depths in the substrate are produced with a single laser pass.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 206)

[CTuP5A-02] Two-dimensional array of multiple-armed chiral surface reliefs in azo-polymers with rotating petal beams [Presentation Style] Onsite

*Arata Tomita[1], Adam Vallés[2], Katsuhiko Miyamoto[1], Takashige Omatsu[1] (1. Chiba Univ. (Japan), 2. Institut de Ciencies Fotoniques (Spain))

[Presentation Style] Onsite

We report on the formation of two-dimensional array of two-/four-armed chiral surface reliefs of azo-polymers by irradiation of a rotating petal-shaped beam with zero orbital angular momentum. Such chiral surface relief array will pave the way towards advanced rewritable ultrahigh-density optical data storages.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 206)

[CTuP5A-03] Direct print of well-aligned close-packed gold microdots with optical vortex irradiation [Presentation Style] Onsite

*Kanta Takahashi[1], Haruki Kawaguchi[1], Rong Wei[1], Keisaku Yamane[2], Ken-ichi Yuyama[3], Satoyuki Kawano[4], Ryuji Morita[2], Nobuyuki Aoki[1], Katsuhiko Miyamoto[1], Takashige Omatsu[1] (1. Chiba Univ. (Japan), 2. Hokkaido Univ. (Japan), 3. Osaka City Univ. (Japan), 4. Osaka Univ. (Japan))

[Presentation Style] Onsite

We demonstrate the direct print of well-aligned gold microdots formed of close-packed gold nanoparticles at high spatial resolution by employing an optical vortex laser-induced forward transfer technique.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 206)

[CTuP5A-04] Creation of a Spring-Shaped Microfiber with Optical Vortex [Presentation Style] Onsite

*Yuto Horiuchi[1], Masataka Shinada[1], Haruki Kawaguchi[1], Katsuhiko Miyamoto[1,2], Yoshihiko Arita[2,3], Takashige Omatsu[1,2] （1. Graduate School of Engineering, Chiba univ. (Japan), 2. MCRC, Chiba univ. (Japan), 3. SUPA, School of Physics and Astronomy, St Andrews univ. (UK)）

[Presentation Style] Onsite

We demonstrate, for the first time, the creation of a spring-shaped microfiber with optical vortex via two-photon absorption. The fiber exhibits a diameter of ~5 µm and a length of ~400 µm, respectively.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 206)

[CTuP5A-05] A compact optical set-up to create high-order vectorial structured light beams

[Presentation Style] Online

*Praveen Kumar[1], Naveen K. Nishchal[2], Takashige Omatsu[1], A Srinivasa Rao[1] （1. Chiba University (Japan), 2. Indian Institute of Technology Patna (India)）

[Presentation Style] Online

This paper describes a method to generate vectorial structured beams using a compact and flexible experimental set-up. A single SLM with calibrated phase response has been used for phase modulation through on-axis configuration.

3D and Volume Processing

Session Chair: Koji Sugioka (RIKEN)

Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 206 (2F)

[CTuP5B-01 (Invited)] Processing the bulk of silicon using IR ultrashort laser pulses – from waveguides to welding

[Presentation Style] Online

*Stefan Nolte[1,2], Namig Alasgarzade[1], Alessandro Alberucci[1], Markus Blothe[1], Chandroth P. Jisha[1], Qingfeng Li[1], Gabor Matthäus[1], Maxime Chambonneau[1]
（1. Friedrich Schiller Univ. Jena (Germany), 2. Fraunhofer IOF (Germany)）

3:30 PM - 4:00 PM

[CTuP5B-02] Micro Raman tomographic imaging on laser internal damage into sapphire for laser cleaving process

[Presentation Style] Onsite

*Teppei Onuki[1], Junnosuke Kuroda[1], Kazuki Kaneko[1], Hirotaka Ojima[1], Jun Shimizu[1], Libo Zhou[1] （1. Ibaraki Univ. (Japan)）

4:00 PM - 4:15 PM

[CTuP5B-03] Microfabrication using Laser-Induced Bubble (microFLIB) of thermoset polymer and its potential techniques

[Presentation Style] Onsite

*Yasutaka Hanada[1] （1. Hirosaki University (Japan)）

4:15 PM - 4:30 PM

[CTuP5B-04] Multiphoton Photoreduction for Biomimetic Applications of Hydrogels

[Presentation Style] Onsite

Yo Nagano[1], Kaneto Tsunemitsu[1], Hiroaki Onoe[1], *Mitsuhiro Terakawa[1] （1. Keio Univ. (Japan)）

4:30 PM - 4:45 PM

[CTuP5B-05] Multi-Material Two-Photon Lithography Using Liquid Bridges Driven by a Permanent Magnet

[Presentation Style] Onsite

*Daiki Ishikawa[1], Taichi Furukawa[1], Masaru Mukai[1], Shoji Maruo[1] （1. Yokohama National University (Japan)）

4:45 PM - 5:00 PM

3:30 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 206)

[CTuP5B-01 (Invited)] Processing the bulk of silicon using IR ultrashort laser pulses – from waveguides to welding [Presentation Style] Online

*Stefan Nolte[1,2], Namig Alasgarzade[1], Alessandro Alberucci[1], Markus Blothe[1], Chandroth P. Jisha[1], Qingfeng Li[1], Gabor Matthäus[1], Maxime Chambonneau[1] (1. Friedrich Schiller Univ. Jena (Germany), 2. Fraunhofer IOF (Germany))

[Presentation Style] Online

We report on processing the bulk of silicon with infrared ultrashort laser pulses. The localized energy deposition and resulting material modifications enable various applications, from the inscription of waveguides to dicing and semiconductor–metal welding.

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 206)

[CTuP5B-02] Micro Raman tomographic imaging on laser internal damage into sapphire for laser cleaving process [Presentation Style] Onsite

*Teppei Onuki[1], Junnosuke Kuroda[1], Kazuki Kaneko[1], Hirotaka Ojima[1], Jun Shimizu[1], Libo Zhou[1] (1. Ibaraki Univ. (Japan))

[Presentation Style] Onsite

We attempt micro Raman Tomographic magingl technique to the evaluation of the location, size, and the severity of laser induced damage on sapphire toward the laser cleaving process

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 206)

[CTuP5B-03] Microfabrication using Laser-Induced Bubble (microFLIB) of thermoset polymer and its potential techniques [Presentation Style] Onsite

*Yasutaka Hanada[1] (1. Hirosaki University (Japan))

[Presentation Style] Onsite

We present microFabrication using Laser-Induced Bubble (microFLIB) of thermoset polymer PDMS. The fundamental characteristics of microFLIB reveals some advantages over the conventional laser direct writing techniques. We also discuss potential techniques of the microFLIB.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 206)

[CTuP5B-04] Multiphoton Photoreduction for Biomimetic Applications of Hydrogels

[Presentation Style] Onsite

Yo Nagano[1], Kaneto Tsunemitsu[1], Hiroaki Onoe[1], *Mitsuhiro Terakawa[1] （1. Keio Univ. (Japan)）

[Presentation Style] Onsite

Light-driven control of the flow velocity inside a hydrogel microchannel is demonstrated by fabricating metal microstructures by multiphoton photoreduction. A technique to evaluate the local strain and compression of the hydrogel will also be described.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 206)

[CTuP5B-05] Multi-Material Two-Photon Lithography Using Liquid Bridges Driven by a Permanent Magnet

[Presentation Style] Onsite

*Daiki Ishikawa[1], Taichi Furukawa[1], Masaru Mukai[1], Shoji Maruo[1] （1. Yokohama National University (Japan)）

[Presentation Style] Onsite

We propose a multi-material two-photon lithography technique using multiple liquid bridges driven by an external magnetic field. Using this method, multi-material 2D and 3D microstructures such as a multicolor overlapping cylinder model were fabricated.

Chip-Scale Comb Sources

Session Chair: Kaoru Minoshima (UEC)

Tue. Aug 2, 2022 1:45 PM - 3:00 PM Room 204 (2F)

[CTuP6A-01 (Invited)] Diode-Laser Frequency-Combs
[Presentation Style] Online

*Steven T Cundiff[1], Matthew Day[1], Mark Dong[1], Herbert Winful[1] (1. Univ. Michigan (United States of America))

1:45 PM - 2:15 PM

[CTuP6A-02] Strong Phase-Noise Suppression of a Kerr Comb via Synchronization to an Optical Parametric Oscillator
[Presentation Style] Onsite

Jae K. Jang[1], Yun Zhao[1], Yoshi Okawachi[1], Xingchen Ji[1], Michal Lipson[1], *Alexander Gaeta[1] (1. Columbia University (United States of America))

2:15 PM - 2:30 PM

[CTuP6A-03] Dark-Bright Soliton Pairs in a Microresonator
[Presentation Style] Onsite

*Shuangyou Zhang[1], Toby Bi[1,2], George N Ghalanos[1,3], Niall P Moroney[1,3], Leonardo Del Bino[1], Pascal Del'Haye[1,2] (1. Max Planck Institute for the Science of Light (Germany), 2. Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany), 3. Imperial College London (UK))

2:30 PM - 2:45 PM

[CTuP6A-04] Enhancement of supercontinuum generation with multi-mode excitation in silicon-nitride waveguide
[Presentation Style] Onsite

*Kouki Yoshida[1,2], Atsushi Ishizawa[1], Rai Kou[3], Xuejun Xu[1], Tai Tsuchizawa[4], Takuma Aihara[4], Yugo Kikkawa[1,2], Tadashi Nishikawa[2], Kenichi Hitach[1], Guangwei Cong[3], Noritsugu Yamamoto[3], Koji Yamada[3], Katsuya Oguri[1] (1. NTT BRL (Japan), 2. Tokyo Denki Univ. (Japan), 3. AIST (Japan), 4. NTT DTL (Japan))

2:45 PM - 3:00 PM

1:45 PM - 2:15 PM (Tue. Aug 2, 2022 1:45 PM - 3:00 PM Room 204)

[CTuP6A-01 (Invited)] Diode-Laser Frequency-Combs
[Presentation Style] Online

*Steven T Cundiff[1], Matthew Day[1], Mark Dong[1], Herbert Winful[1] (1. Univ. Michigan (United States of America))

[Presentation Style] Online

We demonstrate coherent comb generation by diode-lasers. These simple, electrically pumped, and inexpensive devices are readily manufactured. We measure the underlying frequency dynamics responsible for the comb spectrum, and conduct dual comb molecular spectroscopy.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:45 PM - 3:00 PM Room 204)

[CTuP6A-02] Strong Phase-Noise Suppression of a Kerr Comb via Synchronization to an Optical Parametric Oscillator
[Presentation Style] Onsite

Jae K. Jang[1], Yun Zhao[1], Yoshi Okawachi[1], Xingchen Ji[1], Michal Lipson[1], *Alexander Gaeta[1] (1. Columbia University (United States of America))

[Presentation Style] Onsite

We demonstrate near-complete suppression of phase noise associated with thermo-refractive noise in microresonator Kerr soliton comb via all-optical synchronization of the comb to an optical parametric oscillator all on a single silicon-nitride chip.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:45 PM - 3:00 PM Room 204)

[CTuP6A-03] Dark-Bright Soliton Pairs in a Microresonator
[Presentation Style] Onsite

*Shuangyou Zhang[1], Toby Bi[1,2], George N Ghalanos[1,3], Niall P Moroney[1,3], Leonardo Del Bino[1], Pascal Del'Haye[1,2] (1. Max Planck Institute for the Science of Light (Germany), 2. Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany), 3. Imperial College London (UK))

[Presentation Style] Onsite

Mutually trapped dark-bright soliton pairs are demonstrated in a microresonator by seeding modes in different dispersion regimes with similar group velocity. Dark-bright-soliton pairs enable frequency combs with nearly constant power in time domain.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 1:45 PM - 3:00 PM Room 204)

[CTuP6A-04] Enhancement of supercontinuum generation with multi-mode excitation in silicon-nitride waveguide
[Presentation Style] Onsite

*Kouki Yoshida[1,2], Atsushi Ishizawa[1], Rai Kou[3], Xuejun Xu[1], Tai Tsuchizawa[4], Takuma Aihara[4], Yugo Kikkawa[1,2], Tadashi Nishikawa[2], Kenichi Hitach[1], Guangwei Cong[3], Noritsugu Yamamoto[3], Koji Yamada[3], Katsuya Oguri[1]
（1. NTT BRL (Japan), 2. Tokyo Denki Univ. (Japan), 3. AIST (Japan), 4. NTT DTL (Japan)）

[Presentation Style] Onsite

We demonstrated the enhancement of supercontinuum generation by 18 dB at a wavelength of 0.6 μm with multimode excitation in a dispersion-controlled silicon-nitride waveguides. The enhancement was observed in the spectral range of 0.4 to 1.0 μm.

Oral Session | CLEO-PR2022 | MIR and THz Comb

MIR and THz Comb

Session Chairs: Minglie Hu (Tianjin Univ.), Haochen Tian (Univ. of Electro-Communications)
Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204 (2F)

[CTuP6B-01 (Invited)] Wide-field mid-infrared imaging based on adiabatic frequency upconversion
[Presentation Style] Online
*Jianan Fang[1], Kun Huang[1], Ming Yan[1], E Wu[1], Heping Zeng[1] (1. East China Normal Univ. (China))
3:30 PM - 4:00 PM

[CTuP6B-02] Quantum Cascade Laser Frequency Comb for Comb-Calibrated Spectroscopy in the Long-Wave Infrared
[Presentation Style] Onsite
*Kenichi N. Komagata[1], Michele Gianella[2], Pierre Jouy[3], Filippos Kapsalidis[4], Mehran Shahmohammadi[4], Mattias Beck[4], Renaud Matthey[1], Valentin J. Wittwer[1], Andreas Hugi[3], Jérôme Faist[4], Lukas Emmenegger[2], Thomas Südmeyer[1], Stéphane Schilt[1] (1. Lab. Temps-Fréquence, Univ. de Neuchâtel (Switzerland), 2. Lab. for Air Pollution / Environmental Tech., Empa (Switzerland), 3. IRsweep AG (Switzerland), 4. Inst. for Quantum Electronics, ETH Zurich (Switzerland))
4:00 PM - 4:15 PM

[CTuP6B-03] Fast and Accurate Dual-Comb Spectroscopy with Mid-Infrared Quantum Cascade Laser Frequency Combs
[Presentation Style] Onsite
*Kenichi N. Komagata[1], Simon Vogel[2], Valentin J. Wittwer[1], Mathieu Bertrand[3], Stéphane Schilt[1], Jérôme Faist[3], Thomas Südmeyer[1], Lukas Emmenegger[2], Michele Gianella[2] (1. Lab. Temps-Fréquence, Univ. de Neuchâtel (Switzerland), 2. Lab. for Air Pollution / Environmental Tech., Empa (Switzerland), 3. Inst. for Quantum Electronics, ETH Zurich (Switzerland))
4:15 PM - 4:30 PM

[CTuP6B-04] Coherent optical-to-terahertz down-conversion via photomixing of comb-rooted optical frequencies
[Presentation Style] Onsite
Dong-Chel Shin[1], *Guseon Kang[1], Byung Soo Kim[1], Young-Jin Kim[1], Seung-Woo Kim[1] (1. KAIST (Korea))
4:30 PM - 4:45 PM

[CTuP6B-05] Fourier-transform spectroscopy with a mid-infrared frequency comb for line-shape study of CO-Ar
[Presentation Style] Onsite
*Akiko Nishiyama[1,2], Grzegorz Kowzan[1], Dominik Charczun[1], Piotr Masłowski[1] (1. Nicolaus Copernicus University in Torun (Poland), 2. National Institute of Advanced Industrial Science and Technology (AIST) (Japan))
4:45 PM - 5:00 PM

[CTuP6B-06] Generation of a mW-class broadband mid-infrared comb using a waveguide-type PPLN crystal and its application to

dual-comb spectroscopy
[Presentation Style] Onsite

*Kazumichi Yoshii[1], Naoya Kuse[1,2], Kazuki Inoue[2], Ryo Mitsumoto[2], Yoshiaki Nakajima[3], Takeshi Yasui[1,2], Kaoru Minoshima[1,3] （1. Inst. of Post-LED Photonics, Tokushima Univ. (Japan), 2. Tokushima Univ. (Japan), 3. Univ. of Electro-Commun. (Japan)）

5:00 PM - 5:15 PM

[CTuP6B-07] Mid-infrared Dual-comb Spectroscopy using Bidirectional Dual-comb Fiber Laser for Greenhouse N2O Gas Detection
[Presentation Style] Onsite

*Jiajie Li[1], Akifumi Asahara[1], Haochen Tian[1,2], Kazumichi Yoshii[3], Takashi Kato[1], Yoshiaki Nakajima[1,4], Kaoru Minoshima[1,3] （1. The University of Electro-Communications (Japan), 2. Research Fellow of the Japan Society for the Promotion of Science (JSPS) (Japan), 3. pLED Tokushima University pLED (Japan), 4. Toho University (Japan)）

5:15 PM - 5:30 PM

3:30 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-01 (Invited)] Wide-field mid-infrared imaging based on adiabatic frequency upconversion [Presentation Style] Online

*Jianan Fang[1], Kun Huang[1], Ming Yan[1], E Wu[1], Heping Zeng[1] (1. East China Normal Univ. (China))

[Presentation Style] Online

Adiabatic frequency upconversion based on a chirped-poling nonlinear crystal was used to realize a large-field-of-view mid-infrared imaging, which further facilitated unprecedented performances with single-photon sensitivity and a MHz-level frame rate.

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-02] Quantum Cascade Laser Frequency Comb for Comb-Calibrated Spectroscopy in the Long-Wave Infrared [Presentation Style] Onsite

*Kenichi N. Komagata[1], Michele Gianella[2], Pierre Jouy[3], Filippos Kapsalidis[4], Mehran Shahmohammadi[4], Mattias Beck[4], Renaud Matthey[1], Valentin J. Wittwer[1], Andreas Hugi[3], Jérôme Faist[4], Lukas Emmenegger[2], Thomas Südmeyer[1], Stéphane Schilt[1] (1. Lab. Temps-Fréquence, Univ. de Neuchâtel (Switzerland), 2. Lab. for Air Pollution / Environmental Tech., Empa (Switzerland), 3. IRsweep AG (Switzerland), 4. Inst. for Quantum Electronics, ETH Zurich (Switzerland))

[Presentation Style] Onsite

We demonstrate the suitability of mid-infrared quantum cascade laser frequency combs as highly-accurate frequency references. We exploit a fully-stabilized quantum cascade laser frequency comb to perform spectroscopy with 100-kHz frequency accuracy at 7.7 μm.

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-03] Fast and Accurate Dual-Comb Spectroscopy with Mid-Infrared Quantum Cascade Laser Frequency Combs [Presentation Style] Onsite

*Kenichi N. Komagata[1], Simon Vogel[2], Valentin J. Wittwer[1], Mathieu Bertrand[3], Stéphane Schilt[1], Jérôme Faist[3], Thomas Südmeyer[1], Lukas Emmenegger[2], Michele Gianella[2] (1. Lab. Temps-Fréquence, Univ. de Neuchâtel (Switzerland), 2. Lab. for Air Pollution / Environmental Tech., Empa (Switzerland), 3. Inst. for Quantum Electronics, ETH Zurich (Switzerland))

[Presentation Style] Onsite

We present a dual-comb spectrometer combining absolute frequency accuracy (600-kHz), fast acquisition (54-ms), and broadband mid-infrared coverage (40-cm-1) near 1300 cm-1. These unique characteristics are realized by chip-based quantum cascade laser frequency combs.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-04] Coherent optical-to-terahertz down-conversion via photomixing of comb-rooted optical frequencies [Presentation Style] Onsite

Dong-Chel Shin[1], *Guseon Kang[1], Byung Soo Kim[1], Young-Jin Kim[1], Seung-Woo Kim[1] (1. KAIST (Korea))

[Presentation Style] Onsite

Coherent down-conversion of an optical reference for the terahertz domain is demonstrated, yielding a residual instability of $3x10^{-15}$ at 1-s and a residual phase noise of −53.2 dBc/Hz at 1 Hz offset.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-05] Fourier-transform spectroscopy with a mid-infrared frequency comb for line-shape study of CO-Ar [Presentation Style] Onsite

*Akiko Nishiyama[1,2], Grzegorz Kowzan[1], Dominik Charczun[1], Piotr Masłowski[1] (1. Nicolaus Copernicus University in Torun (Poland), 2. National Institute of Advanced Industrial Science and Technology (AIST) (Japan))

[Presentation Style] Onsite

We developed a mid-infrared optical frequency comb-based Fourier-transform spectroscopy system and applied for line-shape study of fundamental vibrational band of CO. The technique allows to determine line-shape parameters precisely in wide range of mid-infrared region.

5:00 PM - 5:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-06] Generation of a mW-class broadband mid-infrared comb using a waveguide-type PPLN crystal and its application to dual-comb spectroscopy [Presentation Style] Onsite

*Kazumichi Yoshii[1], Naoya Kuse[1,2], Kazuki Inoue[2], Ryo Mitsumoto[2], Yoshiaki Nakajima[3], Takeshi Yasui[1,2], Kaoru Minoshima[1,3] (1. Inst. of Post-LED Photonics, Tokushima Univ. (Japan), 2. Tokushima Univ. (Japan), 3. Univ. of Electro-Commun. (Japan))

[Presentation Style] Onsite

We generated a broadband mid-infrared comb of 2.7-4.6 μm with an output of 2.7 mW based on an Er:fiber comb as a fundamental light using a waveguide-type PPLN crystal. A dual-comb spectrometer using these combs was developed.

5:15 PM - 5:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Room 204)

[CTuP6B-07] Mid-infrared Dual-comb Spectroscopy using Bidirectional Dual-comb Fiber Laser for Greenhouse N2O Gas Detection [Presentation Style] Onsite

*Jiajie Li[1], Akifumi Asahara[1], Haochen Tian[1,2], Kazumichi Yoshii[3], Takashi Kato[1], Yoshiaki Nakajima[1,4], Kaoru Minoshima[1,3] （1. The University of Electro-Communications (Japan), 2. Research Fellow of the Japan Society for the Promotion of Science (JSPS) (Japan), 3. pLED Tokushima University pLED (Japan), 4. Toho University (Japan)）

[Presentation Style] Onsite

We demonstrate mid-infrared dual-comb gas spectroscopy using a bidirectional dual-comb fiber laser. Without complex tight-locking, we detect N2O absorption lines consistent with HITRAN database. The developed scheme is useful for practical greenhouse gas detection.

Novel Quantum Systems

Session Chair: Shuntaro Takeda (Univ. of Tokyo)

Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall A (1F)

[CTuP7B-01 (Invited)] Silicon photonics for quantum information and communication

[Presentation Style] Onsite

*Nobuyuki Matsuda[1] (1. Tohoku Univ. (Japan))

1:30 PM - 2:00 PM

[CTuP7B-02] Topologically Protected Entanglement Emitters

[Presentation Style] Online

*Tianxiang Dai[1], Yutian Ao[1], Jueming Bao[1], Jun Mao[1], Yulin Chi[1], Zhaorong Fu[1], Yilong You[1], Xiaojing Chen[1], Chonghao Zhai[1], Bo Tang[2], Yan Yang[2], Zhihua Li[2], Luqi Yuan[3], Fei Gao[4], Xiao Lin[4], Mark G. Thompson[5], Jeremy L. O'Brien[6], Yan Li[1], Xiaoyong Hu[1], Qihuang Gong[1], Jianwei Wang[1] (1. Peking Univ. (China), 2. Chinese Academy of Scis. (China), 3. Shanghai Jiao Tong Univ. (China), 4. Zhejiang Univ. (China), 5. Univ. of Bristol (UK), 6. The Univ.of Western Australia (Australia))

2:00 PM - 2:15 PM

[CTuP7B-03] Femtosecond Laser Direct Writing of Path Encoded Two-qubit and Multiqubit Photonic Quantum Gate Chips

[Presentation Style] Online

*Meng Li[1], Chu Li[1], Yang Chen[2], Lan-Tian Feng[2], Xi-Feng Ren[2], Qihuang Gong[1,3,4,5], Yan Li[1,3,4,5] (1. State Key Lab. for Artificial Microstructure and Mesoscopic Phys., School of Phys., Peking Univ., Beijing (China), 2. CAS Key Lab. of Quantum Info., Univ.of Sci. and Tech. of China, Hefei (China), 3. Frontiers Sci. Center for Nano-Optoelectronics, Peking Univ., Beijing (China), 4. Collaborative Innovation Center of Extreme Optics, Shanxi Univ., Taiyuan, Shanxi (China), 5. Peking Univ. Yangtze Delta Inst. of Optoelectronics, Nantong (China))

2:15 PM - 2:30 PM

[CTuP7B-04] Single- and Multi-Phonon Subtraction to a Mechanical Thermal State via Optomechanics

[Presentation Style] Onsite

*Andreas Svela[1,2], Georg Enzian[2,3], Lars Freisem[1,2], John J. Price[1,2], Jack Clarke[1], Biveen Shajilal[4], Jiri Janousek[4], Ben Buchler[4], Ping K. Lam[4], Michael Vanner[1,2] (1. Blackett Lab., Imperial College London (UK), 2. Clarendon Lab., Univ. of Oxford (UK), 3. Niels Bohr Inst., Univ. of Copenhagen (Denmark), 4. Res. School of Physics and Eng., Australian National Univ. (Australia))

2:30 PM - 2:45 PM

[CTuP7B-05] Quantum Engineering the Effective Optomechanical Coupling in Diamond Resonators

*Mikolaj K. Schmidt[1], Christopher G. Poulton[2], Michael J. Steel[1] (1. Macquarie Univ. (Australia), 2. Univ. of Tech. Sydney (Australia))

2:45 PM - 3:00 PM

1:30 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall A)

[CTuP7B-01 (Invited)] Silicon photonics for quantum information and communication

[Presentation Style] Onsite

*Nobuyuki Matsuda[1] (1. Tohoku Univ. (Japan))

[Presentation Style] Onsite

Silicon photonics is a versatile platform for information science and technology using light. This talk reviews our silicon photonics-based devices for quantum information processing and large-capacity optical communication systems.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall A)

[CTuP7B-02] Topologically Protected Entanglement Emitters

[Presentation Style] Online

*Tianxiang Dai[1], Yutian Ao[1], Jueming Bao[1], Jun Mao[1], Yulin Chi[1], Zhaorong Fu[1], Yilong You[1], Xiaojing Chen[1], Chonghao Zhai[1], Bo Tang[2], Yan Yang[2], Zhihua Li[2], Luqi Yuan[3], Fei Gao[4], Xiao Lin[4], Mark G. Thompson[5], Jeremy L. O'Brien[6], Yan Li[1], Xiaoyong Hu[1], Qihuang Gong[1], Jianwei Wang[1] (1. Peking Univ. (China), 2. Chinese Academy of Scis. (China), 3. Shanghai Jiao Tong Univ. (China), 4. Zhejiang Univ. (China), 5. Univ. of Bristol (UK), 6. The Univ.of Western Australia (Australia))

[Presentation Style] Online

We report topologically-protected entanglement emitters, that emit topological Einstein-Podolsky-Rosen state and multiphoton entangled state from a plug-and-play silicon-photonic chip emulating a photonic anomalous Floquet insulator in ambient conditions.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall A)

[CTuP7B-03] Femtosecond Laser Direct Writing of Path Encoded Two-qubit and Multiqubit Photonic Quantum Gate Chips

[Presentation Style] Online

*Meng Li[1], Chu Li[1], Yang Chen[2], Lan-Tian Feng[2], Xi-Feng Ren[2], Qihuang Gong[1,3,4,5], Yan Li[1,3,4,5] (1. State Key Lab. for Artificial Microstructure and Mesoscopic Phys., School of Phys., Peking Univ., Beijing (China), 2. CAS Key Lab. of Quantum Info., Univ.of Sci. and Tech. of China, Hefei (China), 3. Frontiers Sci. Center for Nano-Optoelectronics, Peking Univ., Beijing (China), 4. Collaborative Innovation Center of Extreme Optics, Shanxi Univ., Taiyuan, Shanxi (China), 5. Peking Univ. Yangtze Delta Inst. of Optoelectronics, Nantong (China))

[Presentation Style] Online

We demonstrate the first realization of path encoded two-qubit photonic quantum gate chip for generating Bell states, three-qubit Toffoli gate and four-qubit Controlled-Controlled-Controlled NOT gate via combining logic gates together by femtosecond laser direct writing.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall A)

[CTuP7B-04] Single- and Multi-Phonon Subtraction to a Mechanical Thermal State via Optomechanics

[Presentation Style] Onsite

*Andreas Svela[1,2], Georg Enzian[2,3], Lars Freisem[1,2], John J. Price[1,2], Jack Clarke[1], Biveen Shajilal[4], Jiri Janousek[4], Ben Buchler[4], Ping K. Lam[4], Michael Vanner[1,2] (1. Blackett Lab., Imperial College London (UK), 2. Clarendon Lab., Univ. of Oxford (UK), 3. Niels Bohr Inst., Univ. of Copenhagen (Denmark), 4. Res. School of Physics and Eng., Australian National Univ. (Australia))

[Presentation Style] Onsite

By heralding events of single- and multi-phonon subtraction to a mechanical thermal state in a Brillouin optomechanical system and using heterodyne tomography, we observe non-Gaussianity in the *s*-parameterised Wigner phase-space distribution.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Mid-sized Hall A)

[CTuP7B-05] Quantum Engineering the Effective Optomechanical Coupling in Diamond Resonators

*Mikolaj K. Schmidt[1], Christopher G. Poulton[2], Michael J. Steel[1] (1. Macquarie Univ. (Australia), 2. Univ. of Tech. Sydney (Australia))

We show how the optomechanical coupling between optical and acoustic modes of a diamond microresonator can be mediated by an ensemble of nitrogen vacancies, and that this quantum-engineered response becomes the dominant in realistic systems.

Quantum Optics with Atoms

Session Chair: Haruka Tanji (UEC)

Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A (1F)

[CTuP7C-01] Cold Atomic Demonstration of Datta-Das Transistor

[Presentation Style] Onsite

Chetan Sriram Madasu[1,2], Mehedi Hasan[1,2], Ketan Rathod[3], *Chang Chi Kwong[1,2], David Wilkowski[1,2,3] (1. School of Physical and Mathematical Sciences, Nanyang Technological Univ. (Singapore), 2. Majulab, International Research Laboratory, IRL 3654, CNRS, Université Côte d'Azur, Sorbonne Université, National University of Singapore, Nanyang Technological University (Singapore), 3. Centre for Quantum Technologies, National Univ. of Singapore (Singapore))

3:30 PM - 3:45 PM

[CTuP7C-02] Strontium-88 cold atomic source with double color Zeeman slower

[Presentation Style] Onsite

*Jianing Li[1], Swarup Das[1], Chang Chi Kwong[1], Thomas Zanon[1], Shau-Yu Lan[1], David Wilkowski[1] (1. Nanyang Technological University (Singapore))

3:45 PM - 4:00 PM

[CTuP7C-03] 400-m-Long Polarization-Maintaining Fibers for Magneto-Optical Trapping of Francium Atoms

[Presentation Style] Online

*Keisuke Nakamura[1], Shintaro Nagase[2], Teruhito Nakashita[3], Tomohiro Hayamizu[4], Takatoshi Aoki[3], Hiroki Nagahama[1], Naoya Ozawa[2], Motoki Sato[3,4], Kazeki Yamane[3], Mirai Fukase[2], Daisuke Uehara[2], Aiko Takamine[4], Yasuhiro Sakemi[1] (1. Center for Nuclear Study, The University of Tokyo (Japan), 2. Department of Physics, the University of Tokyo (Japan), 3. Graduate School of Arts and Sciences, the University of Tokyo (Japan), 4. Nishina Center for Accelerator-Based Science, RIKEN (Japan))

4:00 PM - 4:15 PM

[CTuP7C-04] Super-resolution spectrometer enabled by a quantum-memory-based time-frequency processor

[Presentation Style] Online

*Mateusz Mazelanik[1], Adam Leszczynski[1], Michal Parniak[1], Wojciech Wasilewski[1] (1. University of Warsaw (Poland))

4:15 PM - 4:30 PM

[CTuP7C-05] Multiplexed quantum memory with many functions: entanglement generation and interferometric processing

[Presentation Style] Online

*Michal Parniak[1,2], Mateusz Mazelanik[1], Adam Leszczynski[1], Michal Lipka[1], Wojciech Wasilewski[1] (1. Univ. of Warsaw (Poland), 2. Univ. of Copenhagen (Denmark))

4:30 PM - 4:45 PM

[CTuP7C-06] Spectral Hologram of a Single Photon

[Presentation Style] Online

*Michal Lipka[1], Michal Parniak[1,2] (1. University of Warsaw (Poland), 2. University of Copenhagen (Denmark))

4:45 PM - 5:00 PM

[CTuP7C-08] Tunable coupling of a single quantum emitter to a composite nanofiber cavity

[Presentation Style] Online

*Ramachandrarao Yalla[1], K. Muhammed Shafi[2], Kali P Nayak[3], Kohzo Hakuta[3] （1. University of Hyderabad (India), 2. Indian Institute of Science (India), 3. University of Electro-Communications (Japan)）

5:15 PM - 5:30 PM

3:30 PM - 3:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-01] Cold Atomic Demonstration of Datta-Das Transistor [Presentation Style] Onsite

Chetan Sriram Madasu[1,2], Mehedi Hasan[1,2], Ketan Rathod[3], *Chang Chi Kwong[1,2], David Wilkowski[1,2,3] (1. School of Physical and Mathematical Sciences, Nanyang Technological Univ. (Singapore), 2. Majulab, International Research Laboratory, IRL 3654, CNRS, Université Côte d'Azur, Sorbonne Université, National University of Singapore, Nanyang Technological University (Singapore), 3. Centre for Quantum Technologies, National Univ. of Singapore (Singapore))

[Presentation Style] Onsite

We experimentally demonstrate an atomtronic analog of the Datta-Das transistor using ultracold atoms, where a sensitive control of the spin rotation in the gate region is achieved using three gaussian beams.

3:45 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-02] Strontium-88 cold atomic source with double color Zeeman slower [Presentation Style] Onsite

*Jianing Li[1], Swarup Das[1], Chang Chi Kwong[1], Thomas Zanon[1], Shau-Yu Lan[1], David Wilkowski[1] (1. Nanyang Technological University (Singapore))

[Presentation Style] Onsite

We design and build up a compact Strontium atomic source based on a new scheme of double-frequency and cross polarization Zeeman slower. With the atomic flux of $2.3x10^{9}$ atom/s, we aim to demonstrate inertial quantum sensing using clock transition of bosonic strontium-88 atoms.

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-03] 400-m-Long Polarization-Maintaining Fibers for Magneto-Optical Trapping of Francium Atoms [Presentation Style] Online

*Keisuke Nakamura[1], Shintaro Nagase[2], Teruhito Nakashita[3], Tomohiro Hayamizu[4], Takatoshi Aoki[3], Hiroki Nagahama[1], Naoya Ozawa[2], Motoki Sato[3,4], Kazeki Yamane[3], Mirai Fukase[2], Daisuke Uehara[2], Aiko Takamine[4], Yasuhiro Sakemi[1] (1. Center for Nuclear Study, The University of Tokyo (Japan), 2. Department of Physics, the University of Tokyo (Japan), 3. Graduate School of Arts and Sciences, the University of Tokyo (Japan), 4. Nishina Center for Accelerator-Based Science, RIKEN (Japan))

[Presentation Style] Online

We installed a 400-m-long polarization-maintaining fiber link for magneto-optical trapping of Francium atoms. Fiber polarization stability of ~9×10^{-4} was achieved with an averaging time of 10 seconds, which even allows fluorescence observation at 20 atoms.

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-04] Super-resolution spectrometer enabled by a quantum-memory-based time-frequency processor
[Presentation Style] Online

*Mateusz Mazelanik[1], Adam Leszczynski[1], Michal Parniak[1], Wojciech Wasilewski[1] (1. University of Warsaw (Poland))

[Presentation Style] Online

We employ an optical quantum memory with build-in processing capabilities to demonstrate a quantum-optimal measurement of frequency separation between two narrow spectral lines.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-05] Multiplexed quantum memory with many functions: entanglement generation and interferometric processing
[Presentation Style] Online

*Michal Parniak[1,2], Mateusz Mazelanik[1], Adam Leszczynski[1], Michal Lipka[1], Wojciech Wasilewski[1] (1. Univ. of Warsaw (Poland), 2. Univ. of Copenhagen (Denmark))

[Presentation Style] Online

We present an optical quantum memory based on cold rubidium atoms that can generate and process quantum states of light. The multimode capacity of the memory enables enhanced implementation of protocols.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-06] Spectral Hologram of a Single Photon
[Presentation Style] Online

*Michal Lipka[1], Michal Parniak[1,2] (1. University of Warsaw (Poland), 2. University of Copenhagen (Denmark))

[Presentation Style] Online

Spectrally-resolved two-photon interference experimentally unveils a spectral-phase footprint of a bandwidth-mismatched interaction between an ultrafast single photon and slowly-relaxing resonant atomic vapor, promising applications in non-invasive sensing of ultrafast transient processes and bringing new fundamental insights.

5:15 PM - 5:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Mid-sized Hall A)

[CTuP7C-08] Tunable coupling of a single quantum emitter to a composite nanofiber cavity
[Presentation Style] Online

*Ramachandrarao Yalla[1], K. Muhammed Shafi[2], Kali P Nayak[3], Kohzo Hakuta[3] （1. University of Hyderabad (India), 2. Indian Institute of Science (India), 3. University of Electro-Communications (Japan)）
[Presentation Style] Online
We demonstrate cavity-enhanced spontaneous emission over a broad wavelength range for a single quantum emitter using a composite nanofiber cavity. We also discuss how the longitudinal polarization of the light appears in the composite cavity.

Emission from Atoms, Quantum Wells, and Quantum Dots

Session Chair: Takasumi Tanabe (Keio Univ.)

Tue. Aug 2, 2022 1:30 PM - 2:45 PM Conference Hall (Oval Room) (1F)

[CTuP8A-01] Erbium-doped Rare-Earth Oxide Thin Film Waveguides for Integrated Quantum Photonic Devices

[Presentation Style] Onsite

*Xuejun Xu[1], Masaya Hiraishi[1,2], Tomohiro Inaba[1], Tai Tsuchizawa[3], Atsushi Ishizawa[1], Haruki Sanada[1], Takehiko Tawara[4], Jevon Longdell[2], Katsuya Oguri[1], Hideki Gotoh[1] （1. NTT Basic Research Laboratories (Japan), 2. University of Otago (New Zealand), 3. NTT Device Technology Laboratories (Japan), 4. Nihon University (Japan)）

1:30 PM - 1:45 PM

[CTuP8A-02] Compression of the Inhomogeneous Broadening of Ensemble Rare-earth Ions Using a Mechanical Resonance

[Presentation Style] Onsite

*Ryuichi Ohta[1], Takuya Hatomura[1,2], Masaya Hiraishi[1], Victor M. Bastidas[1,2], Xuejun Xu[1], Katsuya Oguri[1], William J. Munro[1,2,3], Hajime Okamoto[1] （1. NTT Basic Res. Lab. (Japan), 2. NTT Res. for Theoretical Quantum Physics (Japan), 3. National Institute of Informatics (Japan)）

1:45 PM - 2:00 PM

[CTuP8A-03] Electron beam excited non-bridging oxygen hole centers in silica as nanophotonic probes

[Presentation Style] Onsite

*Mark Sadgrove[1], Masaru Irita[1], Yoshinori Uemura[1], Sogo Ito[1], Yuta Osawa[1], Sho Kikuchi, Yoshikazu Homma[1] （1. Tokyo University of Science (Japan)）

2:00 PM - 2:15 PM

[CTuP8A-04] Polarization-independent Light Emission from Air-bridge Bull's-eye Cavities Containing a GaAs Quantum Well

[Presentation Style] Onsite

*Sangmin Ji[1], Takeyoshi Tajiri[2], Xiao-Fei Liu[3], Haruki Kiyama[3], Akira Oiwa[3], Julian Ritzmann[4], Arne Ludwig[4], Andreas Dirk Wieck[4], Satoshi Iwamoto[1] （1. The Univ. of Tokyo (Japan), 2. Univ. of Electro-Communications (Japan), 3. Osaka Univ. (Japan), 4. Ruhr-Universität Bochum (Germany)）

2:15 PM - 2:30 PM

[CTuP8A-05] Expanding ultrahigh-Q r/a range of L3 nanocavity by large-scale automated optimization

[Presentation Style] Onsite

*Eiichi Kuramochi[1], Shota Kita[1], Akihiko Shinya[1], Masaya Notomi[1,2] （1. NTT Corp. (Japan), 2. Tokyo Tech. (Japan)）

2:30 PM - 2:45 PM

1:30 PM - 1:45 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Conference Hall (Oval Room))

[CTuP8A-01] Erbium-doped Rare-Earth Oxide Thin Film Waveguides for Integrated Quantum Photonic Devices
[Presentation Style] Onsite

*Xuejun Xu[1], Masaya Hiraishi[1,2], Tomohiro Inaba[1], Tai Tsuchizawa[3], Atsushi Ishizawa[1], Haruki Sanada[1], Takehiko Tawara[4], Jevon Longdell[2], Katsuya Oguri[1], Hideki Gotoh[1] （1. NTT Basic Research Laboratories (Japan), 2. University of Otago (New Zealand), 3. NTT Device Technology Laboratories (Japan), 4. Nihon University (Japan)）

[Presentation Style] Onsite

We have developed a low-loss waveguide platform for erbium-doped rare-earth oxide thin films grown on silicon substrate and investigated optical properties of erbium ions in waveguides at cryogenic temperature, aiming for integrated quantum photonic devices.

1:45 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Conference Hall (Oval Room))

[CTuP8A-02] Compression of the Inhomogeneous Broadening of Ensemble Rare-earth Ions Using a Mechanical Resonance
[Presentation Style] Onsite

*Ryuichi Ohta[1], Takuya Hatomura[1,2], Masaya Hiraishi[1], Victor M. Bastidas[1,2], Xuejun Xu[1], Katsuya Oguri[1], William J. Munro[1,2,3], Hajime Okamoto[1] （1. NTT Basic Res. Lab. (Japan), 2. NTT Res. for Theoretical Quantum Physics (Japan), 3. National Institute of Informatics (Japan)）

[Presentation Style] Onsite

We propose a scheme to create the collective mode of ensemble rare-earth ions with a mechanical resonance, which significantly reduces the inhomogeneity of the ions and improves their photon emission and absorption efficiencies.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Conference Hall (Oval Room))

[CTuP8A-03] Electron beam excited non-bridging oxygen hole centers in silica as nanophotonic probes
[Presentation Style] Onsite

*Mark Sadgrove[1], Masaru Irita[1], Yoshinori Uemura[1], Sogo Ito[1], Yuta Osawa[1], Sho Kikuchi, Yoshikazu Homma[1] （1. Tokyo University of Science (Japan)）

[Presentation Style] Onsite

We demonstrate the excitation of small numbers of non-bridging oxygen hole centers (NBOHCs) in a silica nanofiber. By collecting fluorescence directly through the fiber, we probe the structure's non-radiative local density of states.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Conference Hall (Oval Room))

[CTuP8A-04] Polarization-independent Light Emission from Air-bridge Bull's-eye Cavities Containing a GaAs Quantum Well
[Presentation Style] Onsite

*Sangmin Ji[1], Takeyoshi Tajiri[2], Xiao-Fei Liu[3], Haruki Kiyama[3], Akira Oiwa[3], Julian Ritzmann[4], Arne Ludwig[4], Andreas Dirk Wieck[4], Satoshi Iwamoto[1] （1. The Univ. of Tokyo (Japan), 2. Univ. of Electro-Communications (Japan), 3. Osaka Univ. (Japan), 4. Ruhr-Universität Bochum (Germany)）

[Presentation Style] Onsite

We demonstrate bull’s-eye cavities containing a single quantum well showing almost polarization-independent emission originating from well-degenerated orthogonally polarized cavity modes. The polarization-independent properties will allow the application of the cavity structure to a photon–spin interface.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 2:45 PM Conference Hall (Oval Room))

[CTuP8A-05] Expanding ultrahigh-Q r/a range of L3 nanocavity by large-scale automated optimization
[Presentation Style] Onsite

*Eiichi Kuramochi[1], Shota Kita[1], Akihiko Shinya[1], Masaya Notomi[1,2] （1. NTT Corp. (Japan), 2. Tokyo Tech. (Japan)）

[Presentation Style] Onsite

We reveal that highly-optimized L3 nanocavity (theoretical $Q>10^7$) are highly sensitive to design parameters. By optimizing the cavity in terms of design parameters, we demonstrated ultrahigh-Q L3 nanocavities at r/a far below/above 0.25.

2D Materials in Nanophotonics and Non-Hermitian Nanophotonics

Session Chair: Ryuichi Ohta (NTT Basic Research Laboratories)

Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room) (1F)

[CTuP8B-01 (Invited)] Quantum Nanophotonics Hexagonal Boron Nitride
[Presentation Style] Online

*Igor Aharonovich[1] （1. University of Technology Sydney (Australia)）

3:30 PM - 4:00 PM

[CTuP8B-02] Efficient graphene-based photodetector with an asymmetric hybrid plasmonic waveguide
[Presentation Style] Onsite

*Masaaki Ono[1,2], Katsumasa Yoshioka[2], Kengo Nozaki[1,2], Akihiko Shinya[1,2], Masaya Notomi[1,2,3] （1. NTT Nanophotonics Center (Japan), 2. NTT Basic Research Labs. (Japan), 3. Tokyo Institute of Technology (Japan)）

4:00 PM - 4:15 PM

[CTuP8B-03] Multi-level anti-counterfeiting based on covert structural features embedded in a fs-laser-treated gold/graphene layer
[Presentation Style] Onsite

*Shiru Jiang[1,2], Su-Han Kim[2], Chul-Soon Park[2], Woo-Bin Lee[1,2], Sang-Shin Lee[1,2] （1. Department of Electronic Engineering, Kwangwoon University (Korea), 2. Nano Device Application Center, Kwangwoon University (Korea)）

4:15 PM - 4:30 PM

[CTuP8B-04 (Invited)] Non-Hermitian nanophotonics with photonic crystal cavities
[Presentation Style] Onsite

*Kenta Takata[1,2], Kengo Nozaki[1,2], Eiichi Kuramochi[1,2], Shinji Matsuo[1,3], Koji Takeda[1,3], Takuro Fujii[1,3], Shota Kita[1,2], Nathan Roberts[2], Akihiko Shinya[1,2], Masaya Notomi[1,2,4] （1. NTT Nanophotonics Center (Japan), 2. NTT Basic Research Labs. (Japan), 3. NTT Device Tech. Labs. (Japan), 4. Tokyo Inst. Tech. (Japan)）

4:30 PM - 5:00 PM

[CTuP8B-05] Chiral response observed at exceptional points in graphene-loaded photonic crystals
[Presentation Style] Online

Syutaro Otsuka[1], *Yuto Moritake[1], Taiki Yoda[2,3], Takahiro Uemura[1], Masaaki Ono[2,3], Eiichi Kuramochi[2,3], Masaya Notomi[1,2,3] （1. Tokyo Inst. of Tech. (Japan), 2. NTT Basic Res. Lab. (Japan), 3. NTT Nanophotonics Center (Japan)）

5:00 PM - 5:15 PM

[CTuP8B-06] Optical non-Hermitian skin effect in continuous media
[Presentation Style] Onsite

*Taiki Yoda[1], Yuto Moritake[2,3], Kazuki Yokomizo[4], Shuichi Murakami[2,5], Masaya Notomi[1,2,6] （1. NTT Basic Research Laboratories (Japan), 2. Tokyo Tech (Japan), 3. JST Presto (Japan), 4. RIKEN (Japan), 5. TIES (Japan), 6. NTT Nanophotonics center (Japan)）

5:15 PM - 5:30 PM

3:30 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room))

[CTuP8B-01 (Invited)] Quantum Nanophotonics Hexagonal Boron Nitride
[Presentation Style] Online

*Igor Aharonovich[1] (1. University of Technology Sydney (Australia))

[Presentation Style] Online

I will discuss emerging trends with HBN quantum photonics

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room))

[CTuP8B-02] Efficient graphene-based photodetector with an asymmetric hybrid plasmonic waveguide
[Presentation Style] Onsite

*Masaaki Ono[1,2], Katsumasa Yoshioka[2], Kengo Nozaki[1,2], Akihiko Shinya[1,2], Masaya Notomi[1,2,3] (1. NTT Nanophotonics Center (Japan), 2. NTT Basic Research Labs. (Japan), 3. Tokyo Institute of Technology (Japan))

[Presentation Style] Onsite

We designed a compact photodetector with a graphene-loaded hybrid plasmonic waveguide that enhances light absorption to 32.1% for a 5-μm length. The asymmetric structure generates photovoltage by the photothermoelectric effect without dark current.

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room))

[CTuP8B-03] Multi-level anti-counterfeiting based on covert structural features embedded in a fs-laser-treated gold/graphene layer
[Presentation Style] Onsite

*Shiru Jiang[1,2], Su-Han Kim[2], Chul-Soon Park[2], Woo-Bin Lee[1,2], Sang-Shin Lee[1,2] (1. Department of Electronic Engineering, Kwangwoon University (Korea), 2. Nano Device Application Center, Kwangwoon University (Korea))

[Presentation Style] Onsite

A gold/graphene hybrid layer works as triple-level anti-counterfeiting after femtosecond laser irradiation. The presence of graphene enables key structural information related to anti-counterfeiting signatures to be covert thoroughly under the surface of the hybrid layer.

4:30 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room))

[CTuP8B-04 (Invited)] Non-Hermitian nanophotonics with photonic

crystal cavities
[Presentation Style] Onsite

*Kenta Takata[1,2], Kengo Nozaki[1,2], Eiichi Kuramochi[1,2], Shinji Matsuo[1,3], Koji Takeda[1,3], Takuro Fujii[1,3], Shota Kita[1,2], Nathan Roberts[2], Akihiko Shinya[1,2], Masaya Notomi[1,2,4] (1. NTT Nanophotonics Center (Japan), 2. NTT Basic Research Labs. (Japan), 3. NTT Device Tech. Labs. (Japan), 4. Tokyo Inst. Tech. (Japan))

[Presentation Style] Onsite

We review recent research of exceptional point degeneracies in on-chip coupled cavities, including our experimental demonstration with electrically pumped photonic crystal lasers and extended coupled-mode theory. We also discuss extra properties of such non-Hermitian systems.

5:00 PM - 5:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room))

[CTuP8B-05] Chiral response observed at exceptional points in graphene-loaded photonic crystals
[Presentation Style] Online

Syutaro Otsuka[1], *Yuto Moritake[1], Taiki Yoda[2,3], Takahiro Uemura[1], Masaaki Ono[2,3], Eiichi Kuramochi[2,3], Masaya Notomi[1,2,3] (1. Tokyo Inst. of Tech. (Japan), 2. NTT Basic Res. Lab. (Japan), 3. NTT Nanophotonics Center (Japan))

[Presentation Style] Online

By using non-Hermitian photonic crystals loaded with graphene, we investigate unique chiral properties of exceptional points in the polarization space. We experimentally observe PT phase transition and chiral asymmetric transmission originating from exceptional points.

5:15 PM - 5:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:30 PM Conference Hall (Oval Room))

[CTuP8B-06] Optical non-Hermitian skin effect in continuous media
[Presentation Style] Onsite

*Taiki Yoda[1], Yuto Moritake[2,3], Kazuki Yokomizo[4], Shuichi Murakami[2,5], Masaya Notomi[1,2,6] (1. NTT Basic Research Laboratories (Japan), 2. Tokyo Tech (Japan), 3. JST Presto (Japan), 4. RIKEN (Japan), 5. TIES (Japan), 6. NTT Nanophotonics center (Japan))

[Presentation Style] Onsite

Although non-Hermitian skin effect has been discussed in periodic media having band structures, we show that continuous media can exhibit similar non-Hermitian skin effects when appropriate loss and anisotropy are incorporated.

High Capacity Optical Transport II

Session Chair: Sugang Xu (NICT)

Tue. Aug 2, 2022 2:00 PM - 3:00 PM Room 207 (2F)

[CTuP9E-01 (Invited)] Towards >100 Tb/s Ultra-Wideband Transmission Systems [Presentation Style] Online

Jeremie Renaudier[1], *Cosimo Calo[2], Amirhossein Ghazisaeidi[1] (1. Nokia Bell Labs (France), 2. III-V Lab (France))

2:00 PM - 2:30 PM

[CTuP9E-02] Real-time 80 × 200-Gb/s DWDM Transmission over 3600-km G.652.D Fiber with 6-THz Bandwidth C-Band Amplifiers [Presentation Style] Online

*Lipeng Feng[1], Anxu Zhang[1], Rong Zhang[2], Yingqing Ma[2], Kai Lv[1], Kai Kang[1], Xiaowei Lou[1], Xiaoli Huo[1], Junjie Li[1] (1. China Telecom Res. Inst. (China), 2. China Telecom Global Ltd. (China))

2:30 PM - 2:45 PM

[CTuP9E-03] 3-Dimensional Constellation Shaping in High Spectral Efficiency Multidimensional Optical Transmission [Presentation Style] Onsite

*Jinwoo Park[1], Joung-Moon Lee[1], Inho Ha[1], Sang-Kook Han[1] (1. Yonsei University (Korea))

2:45 PM - 3:00 PM

2:00 PM - 2:30 PM (Tue. Aug 2, 2022 2:00 PM - 3:00 PM Room 207)

[CTuP9E-01 (Invited)] Towards >100 Tb/s Ultra-Wideband Transmission Systems
[Presentation Style] Online

Jeremie Renaudier[1], *Cosimo Calo[2], Amirhossein Ghazisaeidi[1] (1. Nokia Bell Labs (France), 2. III-V Lab (France))

[Presentation Style] Online

We report on the use of semiconductor optical amplifiers to enlarge optical bandwidth of next generation WDM systems. We review recent advances and achievements paving the way for >100 Tb/s fiber communications systems.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 2:00 PM - 3:00 PM Room 207)

[CTuP9E-02] Real-time 80 × 200-Gb/s DWDM Transmission over 3600-km G.652.D Fiber with 6-THz Bandwidth C-Band Amplifiers
[Presentation Style] Online

*Lipeng Feng[1], Anxu Zhang[1], Rong Zhang[2], Yingqing Ma[2], Kai Lv[1], Kai Kang[1], Xiaowei Lou[1], Xiaoli Huo[1], Junjie Li[1] (1. China Telecom Res. Inst. (China), 2. China Telecom Global Ltd. (China))

[Presentation Style] Online

We successfully demonstrate a record real-time transmission over 3600-km common G.652.D fiber with at least 7.9-dB OSNR margins using a commercially available 200-Gb/s PDM-QPSK transponder, which reserves more than 3-dB engineering link budget for each 100-km span.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 2:00 PM - 3:00 PM Room 207)

[CTuP9E-03] 3-Dimensional Constellation Shaping in High Spectral Efficiency Multidimensional Optical Transmission
[Presentation Style] Onsite

*Jinwoo Park[1], Joung-Moon Lee[1], Inho Ha[1], Sang-Kook Han[1] (1. Yonsei University (Korea))

[Presentation Style] Onsite

Multidimensional optical modulation is critical in next-generation optical communication to achieve high spectral efficiency. 3-Dimensional geometric and Probabilistic constellation shaping technique is proposed in multidimensional optical modulation and performance is verified with transmission simulation.

Novel Concepts and Fundamentals

Session Chair: Joji Maeda (Tokyo Univ. of Sci.)

Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207 (2F)

[CTuP9F-01] Compact Nyquist Transmitter based on Silicon Carrier Injection Ring Modulator

[Presentation Style] Online

*Mohamed I.Hosni[1], Karanveer Singh[1], Younus Mandalawi[1], Arijit Misra[1], Stefan Preussler[1], Ayman Mohammed Mokhtar[2], Thomas Schneider[1] （1. TU Braunschweig (Germany), 2. MTC (Egypt)）

3:30 PM - 3:45 PM

[CTuP9F-02] Generalized Carrier Assisted Differential Detection Receiver with Simplest Structure

[Presentation Style] Online

*Yixiao Zhu[1], Weisheng Hu[1] （1. Shanghai Jiao Tong University (China)）

3:45 PM - 4:00 PM

[CTuP9F-03] Modulation Format Conversion From Three BPSK to One 8QAM Based on Coherent Interference and XPM

[Presentation Style] Onsite

*Taiga Ishida[1], Hiroki Kishikawa[1], Junichi Fujikata[1] （1. Tokushima University (Japan)）

4:00 PM - 4:15 PM

[CTuP9F-04] Performance Enhancement of 4-D QAM-MDPSK Optical Transmission Using Set-Partitioning

[Presentation Style] Onsite

*Joungmoon Lee[1], Inho Ha[1], Jinwoo Park[1], Sang-Kook Han[1] （1. Yonsei University (Korea)）

4:15 PM - 4:30 PM

[CTuP9F-05] Quantum-Noise-Limited Performance of BPSK Transmission with EDFAs, PSAs, or Raman Amplifiers

[Presentation Style] Onsite

*kyo Inoue[1] （1. Osaka University (Japan)）

4:30 PM - 4:45 PM

[CTuP9F-06] A Low-Latency DWBA Scheme for TWDM-PON Based Fronthaul Network with Non-Zero Laser Tuning Time

[Presentation Style] Online

*Yuansen CHENG[1], Chun-Kit CHAN[1] （1. CUHK (Hong Kong)）

4:45 PM - 5:00 PM

3:30 PM - 3:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207)

[CTuP9F-01] Compact Nyquist Transmitter based on Silicon Carrier Injection Ring Modulator
[Presentation Style] Online

*Mohamed I.Hosni[1], Karanveer Singh[1], Younus Mandalawi[1], Arijit Misra[1], Stefan Preussler[1], Ayman Mohammed Mokhtar[2], Thomas Schneider[1] (1. TU Braunschweig (Germany), 2. MTC (Egypt))

[Presentation Style] Online

We demonstrate simulation results for a very compact Nyquist signal transmission system based on integrated silicon ring modulators.

3:45 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207)

[CTuP9F-02] Generalized Carrier Assisted Differential Detection Receiver with Simplest Structure
[Presentation Style] Online

*Yixiao Zhu[1], Weisheng Hu[1] (1. Shanghai Jiao Tong University (China))

[Presentation Style] Online

We propose a generalized carrier assisted differential detection receiver featuring simplest structure of 2×2 optical coupler and 2 single-ended photodiodes. The performance of the designed receiver is comprehensively evaluated through numerical simulation.

4:00 PM - 4:15 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207)

[CTuP9F-03] Modulation Format Conversion From Three BPSK to One 8QAM Based on Coherent Interference and XPM
[Presentation Style] Onsite

*Taiga Ishida[1], Hiroki Kishikawa[1], Junichi Fujikata[1] (1. Tokushima University (Japan))

[Presentation Style] Onsite

Modulation format conversion from three BPSK to one 8QAM based on coherent interference and cross phase modulation is proposed. Calculated BER performance and constellation diagram show that error-free conversion can be achieved.

4:15 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207)

[CTuP9F-04] Performance Enhancement of 4-D QAM-MDPSK Optical Transmission Using Set-Partitioning
[Presentation Style] Onsite

*Joungmoon Lee[1], Inho Ha[1], Jinwoo Park[1], Sang-Kook Han[1] （1. Yonsei University (Korea)）
[Presentation Style] Onsite
In multidimensional optical modulation combining both optical intensity and phase signals, inter-dimensional interference (IDI) occurs which degrades the error performances. We propose 4-D set partitioning QAM-MDPSK optical transmissions which lowers the error floor effectively.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207)

[CTuP9F-05] Quantum-Noise-Limited Performance of BPSK Transmission with EDFAs, PSAs, or Raman Amplifiers [Presentation Style] Onsite

*kyo Inoue[1] （1. Osaka University (Japan)）
[Presentation Style] Onsite
This study investigates the quantum-noise-limited performance of BPSK transmission using EDFAs, PSAs, or Raman amplifiers as repeaters. Calculations based on quantum-mechanical analysis qualitatively show that bidirectionally pumped Raman systems achieve considerably long transmission distances.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 207)

[CTuP9F-06] A Low-Latency DWBA Scheme for TWDM-PON Based Fronthaul Network with Non-Zero Laser Tuning Time [Presentation Style] Online

*Yuansen CHENG[1], Chun-Kit CHAN[1] （1. CUHK (Hong Kong)）
[Presentation Style] Online
The influence of laser tuning delay is investigated for the TWDM-PON based fronthaul transmission and proposed a WT-DWBA scheme to improve the bandwidth efficiency. We realize a superior performance in wavelength reduction up to 47%.

Novel Light-emitting and Detection Devices

Session Chairs: Judy Rorison (Univ. of Bristol), Takuo Tanemura (Univ. of Tokyo)
Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 104&105 (1F)

[CTuP11E-01 (Invited(P))] Control of Vector Beam Polarization Mode by Spatially Modulated Photonic-crystal Lasers
[Presentation Style] Onsite
*Kyoko Kitamura[1,2], Seira Kotera[1], Masako Yone[1], Kazuaki Yoshida[1], Susumu Noda[2] (1. Kyoto Inst. of Tech. (Japan), 2. Kyoto Univ. (Japan))
1:30 PM - 2:00 PM

[CTuP11E-02] Ultrafast and high-power green micro-LED for visible light communications
[Presentation Style] Online
*Junfei Wang[1], Chicheng Ma[1], Dong Li[1], Junhui Hu[1], Shulan Yi[1], Shanshan Wang[1], Yuqi Hou[1], Yingnan Ma[1], Jianyang Shi[1,2,3], Junwen Zhang[1,2,3,4], Ziwei Li[1,2,3,4], Nan Chi[1,2,3,4], Chao Shen[1,2,3,4] (1. Fudan University (China), 2. Shanghai Engineering Research Center of Low-Earth-Orbit Satellite Communication and Applications (China), 3. Shanghai Collaborative Innovation Center of Low-Earth-Orbit Satellite Communication Technology (China), 4. Peng Cheng Laboratory (China))
2:00 PM - 2:15 PM

[CTuP11E-03] Direct printing of organic micro-disk cavity lasers on waveguides in optical integrated circuits
[Presentation Style] Onsite
*Kota Hiramoto[1], Nasim Obata[1], Alexander Eich[2,3,4], Yuya Mikami[1], Abdul Nasir[1], Naoya Tate[1], Yuji Oki[1], Carsten Schuck[2,3,4], Hiroaki Yoshioka[1] (1. Graduate School and Faculty of Information Science and Electrical Engineering, Kyushu Univ. (Japan), 2. Institute of Physics, Univ. of Münster (Germany), 3. Center for Nanotechnology (Germany), 4. Center for Soft Nanoscience (Germany))
2:15 PM - 2:30 PM

[CTuP11E-04] Simulations of two-well THz-QCL structures with non-equilibrium Green’ s function method
[Presentation Style] Onsite
*Hiroaki Yasuda[1], Norihiko Sekine[1], Iwao Hosako[1] (1. NICT (Japan))
2:30 PM - 2:45 PM

[CTuP11E-05] Ultra-broadband photodetector module toward 200 GHz using UTC-PD and frequency compensation technique
[Presentation Style] Onsite
*Toshimasa Umezawa[1], Atsushi Matsumoto[1], Kouichi Akahane[1], Atsushi Kanno[1], Naokatsu Yamamoto[1] (1. National Institute of Information and Communications Technology (NICT) (Japan))
2:45 PM - 3:00 PM

1:30 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 104&105)

[CTuP11E-01 (Invited(P))] Control of Vector Beam Polarization Mode by Spatially Modulated Photonic-crystal Lasers [Presentation Style] Onsite

*Kyoko Kitamura[1,2], Seira Kotera[1], Masako Yone[1], Kazuaki Yoshida[1], Susumu Noda[2] (1. Kyoto Inst. of Tech. (Japan), 2. Kyoto Univ. (Japan))

[Presentation Style] Onsite

We demonstrate a single-chip vector beam generator by designing spatial modulation of modulated photonic-crystal lasers. The polarization modes of the output beam are controlled by mode selection of the laser.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 104&105)

[CTuP11E-02] Ultrafast and high-power green micro-LED for visible light communications [Presentation Style] Online

*Junfei Wang[1], Chicheng Ma[1], Dong Li[1], Junhui Hu[1], Shulan Yi[1], Shanshan Wang[1], Yuqi Hou[1], Yingnan Ma[1], Jianyang Shi[1,2,3], Junwen Zhang[1,2,3,4], Ziwei Li[1,2,3,4], Nan Chi[1,2,3,4], Chao Shen[1,2,3,4] (1. Fudan University (China), 2. Shanghai Engineering Research Center of Low-Earth-Orbit Satellite Communication and Applications (China), 3. Shanghai Collaborative Innovation Center of Low-Earth-Orbit Satellite Communication Technology (China), 4. Peng Cheng Laboratory (China))

[Presentation Style] Online

High power green micro-LED is essential for extending the range of free-space and underwater visible light communication systems. We demonstrate a ~520nm micro-LED with 11.5mW output power, achieving a data rate of 3.77Gbps.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 104&105)

[CTuP11E-03] Direct printing of organic micro-disk cavity lasers on waveguides in optical integrated circuits [Presentation Style] Onsite

*Kota Hiramoto[1], Nasim Obata[1], Alexander Eich[2,3,4], Yuya Mikami[1], Abdul Nasir[1], Naoya Tate[1], Yuji Oki[1], Carsten Schuck[2,3,4], Hiroaki Yoshioka[1] (1. Graduate School and Faculty of Information Science and Electrical Engineering, Kyushu Univ. (Japan), 2. Institute of Physics, Univ. of Münster (Germany), 3. Center for Nanotechnology (Germany), 4. Center for Soft Nanoscience (Germany))

[Presentation Style] Onsite

We have used inkjet printing for integrating organic microcavity lasers vertically on top of optical waveguides embedded into photonic integrated circuits. This achievement will enable three-dimensional circuits and exploiting novel heterogeneous material combinations.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 104&105)

[CTuP11E-04] Simulations of two-well THz-QCL structures with non-equilibrium Green’ s function method

[Presentation Style] Onsite

*Hiroaki Yasuda[1], Norihiko Sekine[1], Iwao Hosako[1] （1. NICT (Japan)）

[Presentation Style] Onsite

We designed a two-well terahertz quantum cascade laser that has the highest gain in the positive differential conductance region and confirmed better THz-QCL performance by using the non-equilibrium Green’s function method.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Room 104&105)

[CTuP11E-05] Ultra-broadband photodetector module toward 200 GHz using UTC-PD and frequency compensation technique

[Presentation Style] Onsite

*Toshimasa Umezawa[1], Atsushi Matsumoto[1], Kouichi Akahane[1], Atsushi Kanno[1], Naokatsu Yamamoto[1] （1. National Institute of Information and Communications Technology (NICT) (Japan)）

[Presentation Style] Onsite

We presented an ultra-broadband photodetector module toward 200-GHz using a UTC-PD chip and a frequency compensation technique. The fabricated PD module exhibited high 3-dB bandwidth over 110-GHz, and the improvement using frequency compensation was discussed.

Novel Semiconductor Lasers

Session Chair: Tatsuro Hiraki (NTT Corp.)

Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 104&105 (1F)

[CTuP11F-01 (Tutorial)] Semiconductor Nanolasers: Progress and Perspective
[Presentation Style] Online

*Cun-Zheng Ning[1,2] (1. Shenzhen Technology University (China), 2. Tsinghua University (China))

3:30 PM - 4:30 PM

[CTuP11F-02] Strain-compensated type-II $GaAs_{1-x}Bi_x/GaN_yAs_{1-y}$ "W" quantum wells for GaAs-based telecom lasers
[Presentation Style] Online

*Zoe C M Davidson[1], Judy M Rorison[1], Stephen J Sweeney[2], Christopher A Broderick[3,4] (1. University of Bristol (UK), 2. University of Surrey (UK), 3. Tyndall National Institute (Ireland), 4. University College Cork (Ireland))

4:30 PM - 4:45 PM

[CTuP11F-03] Theory of highly-strained InAs quantum well lasers grown on InP for optical communications at 2 μm
[Presentation Style] Online

*Zoe C M Davidson[1], Judy M Rorison[1], Christopher A Broderick[2,3] (1. University of Bristol (UK), 2. Tyndall National Institute (Ireland), 3. University College Cork (Ireland))

4:45 PM - 5:00 PM

3:30 PM - 4:30 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 104&105)

[CTuP11F-01 (Tutorial)] Semiconductor Nanolasers: Progress and Perspective
[Presentation Style] Online

*Cun-Zheng Ning[1,2] (1. Shenzhen Technology University (China), 2. Tsinghua University (China))

[Presentation Style] Online

This is a tutorial review of the progress made over the last 15 years on semiconductor plasmonic nanolasers and the related development. Motivations, key results, remaining challenges, and potential on-chip applications will be discussed.

4:30 PM - 4:45 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 104&105)

[CTuP11F-02] Strain-compensated type-II $GaAs_{1-x}Bi_x/GaN_yAs_{1-y}$ "W" quantum wells for GaAs-based telecom lasers
[Presentation Style] Online

*Zoe C M Davidson[1], Judy M Rorison[1], Stephen J Sweeney[2], Christopher A Broderick[3,4] (1. University of Bristol (UK), 2. University of Surrey (UK), 3. Tyndall National Institute (Ireland), 4. University College Cork (Ireland))

[Presentation Style] Online

We theoretically analyse strain-compensated $GaAs_{1-x}Bi_x/GaN_yAs_{1-y}$ "W-type" quantum wells, demonstrating a viable approach to achieve efficient GaAs-based 1.3 and 1.55 µm lasers in which non-radiative Auger recombination is expected to be mitigated by type-II band offsets.

4:45 PM - 5:00 PM (Tue. Aug 2, 2022 3:30 PM - 5:00 PM Room 104&105)

[CTuP11F-03] Theory of highly-strained InAs quantum well lasers grown on InP for optical communications at 2 μ m
[Presentation Style] Online

*Zoe C M Davidson[1], Judy M Rorison[1], Christopher A Broderick[2,3] (1. University of Bristol (UK), 2. Tyndall National Institute (Ireland), 3. University College Cork (Ireland))

[Presentation Style] Online

We present a theoretical analysis of highly-strained InAs quantum well lasers grown on InP for use in next-generation hollow-core fibre optical communications close to 2 μm, and validate our calculations against recent experimental data.

Metamaterial Absorber and Thermal Devices

Session Chair: Ryo Kato (Tokushima Univ.)

Tue. Aug 2, 2022 1:30 PM - 3:00 PM Small Hall (2F)

[CTuP16E-01 (Invited)] Mutual Control of Heat-Light by Si Metasurface
[Presentation Style] Onsite

*Junichi Takahara[1], Rongyang Xu[1] (1. Osaka University (Japan))

1:30 PM - 2:00 PM

[CTuP16E-02] Metamaterial Thermoelectric Generation under Uniform Temperature Environment
[Presentation Style] Onsite

*Wakana Kubo[1] (1. Tokyo Univ. of Agri. and Technol. (Japan))

2:00 PM - 2:15 PM

[CTuP16E-03] Assembly of All-Dielectric Broadband Perfect Absorbers Based on Degenerate Critical Coupling
[Presentation Style] Onsite

*Rongyang Xu[1], Junichi Takahara[1] (1. Osaka University (Japan))

2:15 PM - 2:30 PM

[CTuP16E-04] Detection of Biological Nanoparticles by Photothermal Convection with Plasmonic Nano-bowl Substrate
[Presentation Style] Onsite

*Masatoshi Kanoda[1,2,3], Hayashi Kota[1,2,3], Mamoru Tamura[2,4], Shiho Tokonami[2,3], Takuya Iida[1,2] (1. Graduate School of Sci., Osaka Prefecture Univ. (Japan), 2. Res. Inst. for Light-induced Acceleration System (RILACS), Osaka Prefecture Univ. (Japan), 3. Graduate School of Eng,, Osaka Prefecture Univ. (Japan), 4. Graduate School of Eng. Sci., Osaka Univ. (Japan))

2:30 PM - 2:45 PM

[CTuP16E-05] Laser-induced microbubble fusion of liposomes and formation of ultralong tubes
[Presentation Style] Onsite

*Akemi Noguchi[1], Chiaki Kojima[1], Ken-ichi Yuyama[1], Tatsuya Shoji[2], Yasuyuki Tsuboi[1] (1. Osaka City Univ. (Japan), 2. Kanagawa Univ. (Japan))

2:45 PM - 3:00 PM

1:30 PM - 2:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Small Hall)

[CTuP16E-01 (Invited)] Mutual Control of Heat-Light by Si Metasurface
[Presentation Style] Onsite

*Junichi Takahara[1], Rongyang Xu[1] (1. Osaka University (Japan))

[Presentation Style] Onsite

We describe single crystalline silicon perfect absorbers in visible and near-infrared region based on degenerate critical coupling. We show that not only dipoles, but also quadrupoles play an important role to realize PAs with higher Q-factor.

2:00 PM - 2:15 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Small Hall)

[CTuP16E-02] Metamaterial Thermoelectric Generation under Uniform Temperature Environment
[Presentation Style] Onsite

*Wakana Kubo[1] (1. Tokyo Univ. of Agri. and Technol. (Japan))

[Presentation Style] Onsite

We propose a thermoelectric device that can produce a thermal gradient even in a uniform-temperature environment.

2:15 PM - 2:30 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Small Hall)

[CTuP16E-03] Assembly of All-Dielectric Broadband Perfect Absorbers Based on Degenerate Critical Coupling
[Presentation Style] Onsite

*Rongyang Xu[1], Junichi Takahara[1] (1. Osaka University (Japan))

[Presentation Style] Onsite

Previous studies about perfect absorbers based on degenerate critical coupling only achieved narrowband absorption. We propose perfect absorbers that can be assembled as building blocks to achieve broadband absorption in the visible and near-infrared ranges.

2:30 PM - 2:45 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Small Hall)

[CTuP16E-04] Detection of Biological Nanoparticles by Photothermal Convection with Plasmonic Nano-bowl Substrate
[Presentation Style] Onsite

*Masatoshi Kanoda[1,2,3], Hayashi Kota[1,2,3], Mamoru Tamura[2,4], Shiho Tokonami[2,3], Takuya Iida[1,2] (1. Graduate School of Sci., Osaka Prefecture Univ. (Japan), 2. Res. Inst. for Light-induced Acceleration System (RILACS), Osaka Prefecture Univ. (Japan), 3. Graduate School of Eng,, Osaka Prefecture Univ. (Japan), 4. Graduate School of Eng. Sci., Osaka Univ. (Japan))

[Presentation Style] Onsite

We developed a plasmonic nano-bowl substrate exhibiting sensitive optical properties due to localized surface plasmons, and demonstrated the optical condensation detection of nanoparticles. Quantitative analysis of nanoparticles was performed by fluorescence imaging and reflectance spectra.

2:45 PM - 3:00 PM (Tue. Aug 2, 2022 1:30 PM - 3:00 PM Small Hall)

[CTuP16E-05] Laser-induced microbubble fusion of liposomes and formation of ultralong tubes [Presentation Style] Onsite

*Akemi Noguchi[1], Chiaki Kojima[1], Ken-ichi Yuyama[1], Tatsuya Shoji[2], Yasuyuki Tsuboi[1] (1. Osaka City Univ. (Japan), 2. Kanagawa Univ. (Japan))

[Presentation Style] Onsite

We discovered a phenomenon of the formation of giant tubular liposomes by small spherical liposomes, those are trapped under a laser-induced bubble on an Au film. In this study, we investigated this phenomenon in detail to elucidate its mechanism.

Oral Session | CLEO-PR2022 | THz Technologies

THz Technologies

Session Chair: Nobuyuki Takeyasu (Okayama Univ.)

Tue. Aug 2, 2022 3:30 PM - 4:00 PM Small Hall (2F)

[CTuP16F-01] A switchable THz filter by integrating an H-shaped metamaterial and ultra-small MEMS switches

[Presentation Style] Onsite

*Ying Huang[1], Taiyu Okatani[1], Yoshiaki Kanamori[1] （1. Tohoku University (Japan)）

3:30 PM - 3:45 PM

[CTuP16F-02] Minimizing radiative losses via interaction of Dark states in terahertz metamaterials

[Presentation Style] Online

*Sukhvinder Kaur[1], Subhajit Karmakar[1], Arun Jana[2], Ravendra K. Varshney[1], Dibakar Roy Chowdhury[2] （1. Indian Institute of Technology, Delhi (India), 2. Mahindra university, Hydrabad (India)）

3:45 PM - 4:00 PM

3:30 PM - 3:45 PM (Tue. Aug 2, 2022 3:30 PM - 4:00 PM Small Hall)

[CTuP16F-01] A switchable THz filter by integrating an H-shaped metamaterial and ultra-small MEMS switches [Presentation Style] Onsite

*Ying Huang[1], Taiyu Okatani[1], Yoshiaki Kanamori[1] (1. Tohoku University (Japan))

[Presentation Style] Onsite

We proposed ultra-fast switchable terahertz (THz) filters consisting of a metamaterial with ultra-small MEMS switches and fabricated static on- and off-state-filters offering a 55%-transmittance-difference at 0.61 THz. A 0.9 MHz-tuning-speed is expected.

3:45 PM - 4:00 PM (Tue. Aug 2, 2022 3:30 PM - 4:00 PM Small Hall)

[CTuP16F-02] Minimizing radiative losses via interaction of Dark states in terahertz metamaterials [Presentation Style] Online

*Sukhvinder Kaur[1], Subhajit Karmakar[1], Arun Jana[2], Ravendra K. Varshney[1], Dibakar Roy Chowdhury[2] (1. Indian Institute of Technology, Delhi (India), 2. Mahindra university, Hydrabad (India))

[Presentation Style] Online

We have demonstrated the coupling of dark resonant states in metamaterial array consisting of two mirrored asymmetric dual gap split-ring resonators (ASRRs). Coupling of these dark states results in hybridized states with high-quality factors.

1. Photonics in the fight against COVID-19

Session Chair: Eiichi Tamiya (AIST and Osaka Univ.)

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Small Hall (2F)

[CTuW1-01] Overview of COVID-19

[Presentation Style] Onsite

*Eiichi Tamiya[1] （1. AIST/Osaka University (Japan)）

6:00 PM - 6:30 PM

[CTuW1-02] Sensitive Detection of Marker Proteins by the Enhanced Fluorescence Technique with a Plasmonic Chip

[Presentation Style] Onsite

*Keiko Tawa[1] （1. Kwansei Gakuin Univ. (Japan)）

6:30 PM - 7:00 PM

[CTuW1-03] Virus inactivation using ultraviolet LEDs

[Presentation Style] Onsite

*Kentaro Nagamatsu[1] （1. Tokushima Univ. (Japan)）

7:00 PM - 7:30 PM

[CTuW1-04] Non-Contact Aerial Interfaces

[Presentation Style] Onsite

*Hirotsugu Yamamoto[1] （1. Utsunomiya Univ. (Japan)）

7:30 PM - 8:00 PM

6:00 PM - 6:30 PM (Tue. Aug 2, 2022 6:00 PM - 8:00 PM Small Hall)

[CTuW1-01] Overview of COVID-19

[Presentation Style] Onsite

*Eiichi Tamiya[1] (1. AIST/Osaka University (Japan))

[Presentation Style] Onsite

The pandemic caused by the new coronavirus began in 2019 and was named COVID-19; unlike the pandemic of 100 years ago, humans have been able to rapidly identify this virus, establish diagnostic methods from infection to disease onset, and try to prevent the spread of infection. Photonics has been contributed extremely much to them. An overview for basic understanding of COVID-19 was presented here.

6:30 PM - 7:00 PM (Tue. Aug 2, 2022 6:00 PM - 8:00 PM Small Hall)

[CTuW1-02] Sensitive Detection of Marker Proteins by the Enhanced Fluorescence Technique with a Plasmonic Chip

[Presentation Style] Onsite

*Keiko Tawa[1] (1. Kwansei Gakuin Univ. (Japan))

[Presentation Style] Onsite

A plasmonic chip with a wavelength-size periodic pattern coated with silver film can provide the enhanced electric field under the resonance condition and it can be applied to the sensitive fluorescence detection.

7:00 PM - 7:30 PM (Tue. Aug 2, 2022 6:00 PM - 8:00 PM Small Hall)

[CTuW1-03] Virus inactivation using ultraviolet LEDs

[Presentation Style] Onsite

*Kentaro Nagamatsu[1] (1. Tokushima Univ. (Japan))

[Presentation Style] Onsite

Virus inactivation technology is attracting much attention to realize mitigation of the spread of COVID-19. There are many approaches for virus inactivation. One of the effective methods well known is directly damaging their RNAs by ultraviolet (UV) light emitting diodes (LED). However, the quantum efficiency in the UV-LED is much lower than that of the visible LEDs. So, a large cooling system is required owing to maintain irradiation because LED generates heat. In this report, the present situation of UV-LED characteristic such as the wavelength, quantum efficiency, and lifetime in LED are shown. Moreover, the virus inactivation effect by the UV-LED with including COVID-19 is explained. Finally, we introduce the recent study in UV-LEDs becoming the common in virus inactivation.

7:30 PM - 8:00 PM (Tue. Aug 2, 2022 6:00 PM - 8:00 PM Small Hall)

[CTuW1-04] Non-Contact Aerial Interfaces

[Presentation Style] Onsite

*Hirotsugu Yamamoto[1] （1. Utsunomiya Univ. (Japan)）

[Presentation Style] Onsite

Non-contact interfaces are expected to be immune to infectious diseases. Aerial display with 3D sensing enables us directly to handle information without physical touch. This paper reviews recent developments and future prospects of aerial display.

3. State-of-the-Art to Next-Era LiDAR Technologies

Session Chairs: Toshihiko Baba (Yokohama National Univ.), Nobuhiko Nishiyama (Tokyo Tech)
Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room) (1F)

[OP(W2)] Opening Remark
6:00 PM - 6:05 PM

[CTuW2-01] Optical Semiconductor Devices for LiDAR
[Presentation Style] Onsite
*Kazuaki Maekita[1], Mitsuhito Mase[1] (1. Hamamatsu Photonics K. K. (Japan))
6:05 PM - 6:30 PM

[CTuW2-02] Solid State VCSEL Beam Scanners for 3D Sensing
[Presentation Style] Online
*Fumio Koyama[1] (1. Tokyo Institute of Technology (Japan))
6:30 PM - 6:55 PM

[CTuW2-03] Progress of photonic-crystal surface-emitting lasers for LiDAR applications
[Presentation Style] Online
*Susumu Noda[1], Menaka De Zoysa[1], Masahiro Yoshida[1], Kenji Ishizaki[1], Takuya Inoue[1], Ryoichi Sakata[1] (1. Kyoto University (Japan))
6:55 PM - 7:20 PM

[CTuW2-04] FMCW LiDAR Chip with SLG Beam Scanner
[Presentation Style] Onsite
*Toshihiko Baba[1], Takemasa Tamanuki[1], Hiroyuki Ito[1], Mikiya Kamata[1], Ryo Tetsuya[1], Saneyuki Suyama[1], Hiroshi Abe[1], Ryo Kurahashi[1] (1. Yokohama National University (Japan))
7:20 PM - 7:45 PM

[CTuW2-05] Photonic Integrated Circuits for LiDAR: Solid-State 2D Beamsteering
[Presentation Style] Onsite
*Marcus S. Dahlem[1], Mathias Prost[1], Sarvagya Dwivedi[1], Jon Ø. Kjellman[1], Bruno Figeys[1], Tangla D. Kongnyuy[1], Aleksandrs Marinins[1], Sandeep S. Saseendran[1], Philippe Soussan[1], Xavier Rottenberg[1], Roelof Jansen[1], Wim Bogaerts[2] (1. IMEC (Belgium), 2. Ghent Univ. - IMEC (Belgium))
7:45 PM - 8:15 PM

[CTuW2-06] Silicon Photonic LiDAR Based on MEMS Focal Plane Switch Array
[Presentation Style] Online
*Ming C. Wu[1] (1. UC Berkeley (United States of America))
8:15 PM - 8:45 PM

6:00 PM - 6:05 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[OP(W2)] Opening Remark

6:05 PM - 6:30 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[CTuW2-01] Optical Semiconductor Devices for LiDAR [Presentation Style] Onsite

*Kazuaki Maekita[1], Mitsuhito Mase[1] (1. Hamamatsu Photonics K. K. (Japan))

[Presentation Style] Onsite

We have been offering many types of optical semiconductor devices for LiDAR. In this presentation, our products required in the various LiDAR application are explained.

6:30 PM - 6:55 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[CTuW2-02] Solid State VCSEL Beam Scanners for 3D Sensing [Presentation Style] Online

*Fumio Koyama[1] (1. Tokyo Institute of Technology (Japan))

[Presentation Style] Online

We review our recent activities on solid-state 1D and 2D VCSEL beam scanners for 3D sensing, exhibiting high resolutions of 1,400 and 33,000, respectively. We show the time-of-flight 3D real-time sensing over 60m distance.

6:55 PM - 7:20 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[CTuW2-03] Progress of photonic-crystal surface-emitting lasers for LiDAR applications [Presentation Style] Online

*Susumu Noda[1], Menaka De Zoysa[1], Masahiro Yoshida[1], Kenji Ishizaki[1], Takuya Inoue[1], Ryoichi Sakata[1] (1. Kyoto University (Japan))

[Presentation Style] Online

Recent progresses of photonic-crystal surface-emitting lasers (PCSELs) are described, particularly based on recently developed photonic crystals, so called “double lattice photonic crystals” and “dually modulated photonic crystals”. Their applications to LiDAR systems are also discussed.

7:20 PM - 7:45 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[CTuW2-04] FMCW LiDAR Chip with SLG Beam Scanner

[Presentation Style] Onsite

*Toshihiko Baba[1], Takemasa Tamanuki[1], Hiroyuki Ito[1], Mikiya Kamata[1], Ryo Tetsuya[1], Saneyuki Suyama[1], Hiroshi Abe[1], Ryo Kurahashi[1] （1. Yokohama National University (Japan)）

[Presentation Style] Onsite

Si photonics slow-light grating based on photonic crystal waveguides allows electrically driven completely nonmechanical beam scanning. We have incorporated it in a fully integrated FMCW LiDAR chip and obtained its real time operation.

7:45 PM - 8:15 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[CTuW2-05] Photonic Integrated Circuits for LiDAR: Solid-State 2D Beamsteering

[Presentation Style] Onsite

*Marcus S. Dahlem[1], Mathias Prost[1], Sarvagya Dwivedi[1], Jon Ø. Kjellman[1], Bruno Figeys[1], Tangla D. Kongnyuy[1], Aleksandrs Marinins[1], Sandeep S. Saseendran[1], Philippe Soussan[1], Xavier Rottenberg[1], Roelof Jansen[1], Wim Bogaerts[2] （1. IMEC (Belgium), 2. Ghent Univ. - IMEC (Belgium)）

[Presentation Style] Onsite

In this work, we summarize our recent advances in 2D beamsteering using optical phased arrays operating in NIR and SWIR wavelengths, covering different architectures and steering techniques based on active phase shifting and wavelength tuning.

8:15 PM - 8:45 PM (Tue. Aug 2, 2022 6:00 PM - 8:45 PM Conference Hall (Oval Room))

[CTuW2-06] Silicon Photonic LiDAR Based on MEMS Focal Plane Switch Array

[Presentation Style] Online

*Ming C. Wu[1] （1. UC Berkeley (United States of America)）

[Presentation Style] Online

Solid-state LiDARs with no mechanical moving parts and fully integrable on a chip have received a great deal of attention. This talk will discuss silicon photonic LiDARs with focal plane MEMS switch array.

Poster Session | CLEO-PR2022 | Poster Session

C4. High Power, High Energy Lasers

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3) (1F)

[P-CTu4-01] Investigation on power scalability of Yb:KREW thin-disk lasers by anisotropic thermo-mechanical analysis
[Presentation Style] Onsite

*Shotaro Kitajima[1], Norihiko Nishizawa[1] (1. Nagoya University (Japan))

[P-CTu4-02] All-Fiber High-Power Chirped Pulse Amplification System at 1.03 μm
[Presentation Style] Online

*Tao Wang[1], Can Li[1], Bo Ren[1], Kun Guo[1], Pu Zhou[1] (1. National University of Defense Technology (China))

[P-CTu4-03] Narrow Linewidth Cr:forsterite Master-Oscillator Power-Amplifier Laser System with Output Energy >45 mJ

*Lyubomir I. Stoychev[1], Marco Baruzzo[2,3], Jose J. Suárez-Vargas[2,3], Humberto Cabrera[2,4], Ivaylo P. Nikolov[5], Alexander A. Demidovich[5], Miltcho B. Danailov[5], Andrea Vacchi[2,3] (1. ISSP, BAS (Bulgaria), 2. INFN Triest (Italy), 3. Univ. Udine (Italy), 4. ICTP, Triest (Italy), 5. Elettra-Sincotrone (Italy))

[P-CTu4-04] Superachromatic Reflective Phase Retarder for the Polarization Conversion of Attosecond Pulses
[Presentation Style] Onsite

*Keisuke Sakata[1], Taro Sekikawa[1], Kengo Ito[1] (1. Hokkaido Univ. (Japan))

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu4-01] Investigation on power scalability of Yb:KREW thin-disk lasers by anisotropic thermo-mechanical analysis

[Presentation Style] Onsite

*Shotaro Kitajima[1], Norihiko Nishizawa[1] （1. Nagoya University (Japan)）

[Presentation Style] Onsite

Thermally induced OPD of the thin-disk laser with anisotropic Yb:KRE$(WO_4)_2$ crystal, which is promising broadband gain media, was calculated. The results show that the OPD is sufficiently small even at 9.6 kW/cm^2 pumping.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu4-02] All-Fiber High-Power Chirped Pulse Amplification System at 1.03 μ m

[Presentation Style] Online

*Tao Wang[1], Can Li[1], Bo Ren[1], Kun Guo[1], Pu Zhou[1] （1. National University of Defense Technology (China)）

[Presentation Style] Online

A high-power all-fiber chirped pulse amplification system is experimentally demonstrated. The average power is scaled up to 536.3 W. The pulse duration is compressed to 781 fs at the output power of 154 W.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu4-03] Narrow Linewidth Cr:forsterite Master-Oscillator Power-Amplifier Laser System with Output Energy >45 mJ

*Lyubomir I. Stoychev[1], Marco Baruzzo[2,3], Jose J. Suárez-Vargas[2,3], Humberto Cabrera[2,4], Ivaylo P. Nikolov[5], Alexander A. Demidovich[5], Miltcho B. Danailov[5], Andrea Vacchi[2,3] （1. ISSP, BAS (Bulgaria), 2. INFN Triest (Italy), 3. Univ. Udine (Italy), 4. ICTP, Triest (Italy), 5. Elettra-Sincotrone (Italy)）

A master-oscillator power-amplifier Cr:forsterite laser is presented with narrow linewidth of only 0.5 pm (95 MHz), beam quality factor Mx2=1.94, My2=1.70, an output energy of 45 mJ and quantum efficiency of 10.5%.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu4-04] Superachromatic Reflective Phase Retarder for the Polarization Conversion of Attosecond Pulses

[Presentation Style] Onsite

*Keisuke Sakata[1], Taro Sekikawa[1], Kengo Ito[1] （1. Hokkaido Univ. (Japan)）

[Presentation Style] Onsite

A reflective superachromatic phase retarder for extreme ultraviolet attosecond pulses was developed using SiC mirrors. The phase retardation at 28.0 eV is 90˚ with a deviation less than $\pm\lambda/50$ for a bandwidth of 3.1 eV.

Poster Session | CLEO-PR2022 | Poster Session

C8. Micro and Nanophotonics, and Light Localization Effects

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3) (1F)

[P-CTu8-01] Dark-pulse Microcombs in Integrated Chalcogenide Microresonators
[Presentation Style] Online
*Di Xia[1], Jiayue Wu[1], Zifu Wang[1], Yufei Li[1], Jiaxin Zhao[1], Liyang Luo[1], Dong Liu[1], Shuixian Yang[1], Bin Zhang[1], Zhaohui Li[1] (1. Sun Yat-sen university (China))

[P-CTu8-02] Milliwatt-threshold widely-tunable optical parametric oscillation in integrated chalcogenide microresonators
[Presentation Style] Online
*Zifu Wang[1], Jiaxin Zhao[1], Di Xia[1], Yufei Li[1], Liyang luo[1], Dong Liu[1], Bin Zhang[1], Zhaohui Li[1] (1. Sun Yat-sen Univ. (China))

[P-CTu8-03] Photonic Crystal-Based Higher Order Mode Pass Filter
[Presentation Style] Online
*Omnia Nawwar[1], Naoya Kuse[1,2] (1. Tokushima Univ. (Japan), 2. PRESTO (Japan))

[P-CTu8-04] Silicon photonic crystal slow-light waveguide in a lattice-shifted perturbed kagome lattice
[Presentation Style] Onsite
*Deji Li[1], Kiyoto Takahata[1] (1. Waseda Univ. (Japan))

[P-CTu8-05] Enhance Photoluminescence of MoS_2 by SiN_x Photonic Crystal Resonators
[Presentation Style] Online
*Tsan-Wen Lu[1], Huan-Yueh Chu[1], Shih-Yen Lin[2], Po-Tsung Lee[1] (1. National Yang Ming Chiao Tung University (Taiwan), 2. Academia Sinica (Taiwan))

[P-CTu8-06] Polarization Characteristics of Polaritonic BCS in $CsPbBr_3$ Microcavity
[Presentation Style] Onsite
*Yuta Moriyama[1], Yusuke Ueda[1], Tsukasa Hirao[1], Tomoya Tagami[1], Shun Takahashi[1], Kenichi Yamashita[1] (1. Kyoto Inst. of Tech. (Japan))

[P-CTu8-07] Plasmonic Ring Resonator Glucose Sensor with Reduced Full width at Half Maximum
[Presentation Style] Online
*Soumya Kumari[1], Yogesh Kumar Verma[1], Saurabh Mani Tripathi[1] (1. Indian Institute of Technology Kanpur (India))

[P-CTu8-08] Highly sensitive microdisk-laser sensor with meta-air-hole patterns
[Presentation Style] Onsite
*Haerin Jeong[1], Myung-Ki Kim[1] (1. Korea University (Korea))

[P-CTu8-09] MXene (Ti3C2TX) Surface Plasmon Resonance (SPR) in the Short-Wave Infrared (SWIR) wavelength
[Presentation Style] Online
*Han-na Kim[1], Da In Song[1], Young-Ho Jin[1], Changhoon Park[1], Chong Min Koo[2], Myung-Ki Kim[1] (1. Korea University (Korea), 2. KIST (Korea))

[P-CTu8-10] Microbubbles photothermally induced on sub-wavelength $FeSi_2$ discs
[Presentation Style] Onsite
*Kyoko Namura[1], Ayaka Hara[1], Motofumi Suzuki[1] (1. Kyoto Univ. (Japan))

[P-CTu8-11] Single Droplet Formation in the Ionic Liquid/Water Mixture by Optical Tweezers
[Presentation Style] Onsite
*Maho Tanaka[1], Yasuyuki Tsuboi[1], Ken-ichi Yuyama[1] （1. Osaka City University (Japan)）

[P-CTu8-12] Optical manipulation of nanoparticles in tapered capillaries: application to the optical sorting of nanodiamonds
[Presentation Style] Onsite
*Christophe Pin[1], O Suzuki[1], Keiji Sasaki[1] （1. Hokkaido Univ. (Japan)）

[P-CTu8-13] "Sensing Kinetics of Ice Recrystallization through Plasmonic Nanoantennas"
[Presentation Style] Onsite
*Nu-Ri Park[1], Yedam Lee[2], Han-Na Kim[1], Sang Yup Lee[1], Dong June Ahn[1,2], Myung-Ki Kim[1] （1. KU-KIST Graduate School of Converging Sci. and Tech., Korea Univ. (Korea), 2. Department of Chemical and Biological Eng., Korea Univ. (Korea)）

[P-CTu8-14] Quest for chiral nanogap structures using topology optimization
[Presentation Style] Onsite
*Yamato Fukui[1], Atsushi Taguchi[1], Keiji Sasaki[1] （1. Hokkaido Univ. (Japan)）

[P-CTu8-15] Multifunctional Reflective Metalens in Broadband Visible Light Band
[Presentation Style] Online
*Aran Yu[1], Da In Song[1], Moohyuk Kim[1], Myung-Ki Kim[1] （1. Korea University (Korea)）

[P-CTu8-16] Simple &precisely printed metasurface on fiber apex
[Presentation Style] Onsite
*Moohyuk Kim[1], Nu-Ri Park[1], Aran Yu[1], Myung-Ki Kim[1] （1. Korea Univ. (Korea)）

[P-CTu8-17] Design and Optimization of Epsilon-Near-Zero Multilayer Structures with Broadband Absorption Performance
[Presentation Style] Online
*Yuqing Wang[1], Jiaye Wu[1], Chenxingyu Huang[1], Ze Tao Xie[1], H. Y. Fu[2], Qian Li[1] （1. Peking Univ. (China), 2. Tsinghua Univ. (China)）

[P-CTu8-18] Organic VCSEL Lattice Fabricated by Nanoimprint Lithography
[Presentation Style] Onsite
*Yuji Adachi[1], Tsukasa Hirao[1], Takuya Enna[1], Takaya Inukai[1], Shun Takahashi[1], Kenichi Yamashita[1] （1. Kyoto Inst. of Tech. (Japan)）

[P-CTu8-19] Fabrication of Lead-Halide Perovskite Film with Two-Dimensional Photonic Lattice
[Presentation Style] Onsite
*Junki Morishita[1], Yuji Adachi[1], Takuya Enna[1], Shun Takahashi[1], Yohei Yamamoto[2], Kenichi Yamashita[1] （1. Kyoto Inst. of Tech. (Japan), 2. Univ. of Tsukuba (Japan)）

[P-CTu8-20] Surface-doped ZnO/Ag/ZnO mesh electrodes for flexible OLEDs with superb efficiency
*Ho Jin Lee[1], Wanqi Ren[1], Na Hyun Kim[1], Hwi Geun Kim[1], Kang Ting[1], Tae Geun Kim[1] （1. Korea University (Korea)）

[P-CTu8-21] III-V gain-block implanted continuous-wave hybrid silicon nanolaser with enhanced heat dissipation
[Presentation Style] Onsite
*Byoung Jun Park[1], Min-Woo Kim[2], Kyoung-Tae Park[2], You-Shin No[1,2], Myung-Ki Kim[1] （1.

Korea Univ. (Korea), 2. Konkuk Univ (Korea))

[P-CTu8-22] Design of a quantum-dot single-photon source on a silicon nitride waveguide for efficient and indistinguishable photon generation
[Presentation Style] Onsite

*Natthajuks Pholsen[1,2], Yasutomo Ota[3,4], Ryota Katsumi[1,2], Yasuhiko Arakawa[4], Satoshi Iwamoto[1,2,4] (1. Res. Center for Advanced Sci. and Tech., The Univ. of Tokyo (Japan), 2. Inst. of Indus. Sci., The Univ. of Tokyo (Japan), 3. Department of Applied Physics and Physio-Informatics, Keio Univ. (Japan), 4. Inst. for Nano Quantum Info. Electronics, The Univ. of Tokyo (Japan))

[P-CTu8-23] Electromagnetic Shielding of Electrically-Insulating Ionic Solution
[Presentation Style] Onsite

*Jisung Kwon[1], Junpyo Hong[2], Aamir Iqubal[2], Chong Min Koo[2], Myung-Ki Kim [1] (1. Korea Univ. (Korea), 2. Korea Inst. of Sci. and Tech. (Korea))

[P-CTu8-24] Sidelobe-Suppressed Bessel Beam using Hologram
[Presentation Style] Onsite

*Jerin Geogy George[1], Yerragadda Guruvaiah[1], Shanti Bhattacharya[1] (1. IIT Madras (India))

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-01] Dark-pulse Microcombs in Integrated Chalcogenide Microresonators
[Presentation Style] Online

*Di Xia[1], Jiayue Wu[1], Zifu Wang[1], Yufei Li[1], Jiaxin Zhao[1], Liyang Luo[1], Dong Liu[1], Shuixian Yang[1], Bin Zhang[1], Zhaohui Li[1] (1. Sun Yat-sen university (China))

[Presentation Style] Online

We demonstrate dark-pulse microcombs generated in an integrated GeSbS microresonator with low pumping power of the ten-milliwatt level. Benefiting from both the high Q-factor and nonlinearity of the microresonator, high-efficiency microcombs are achieved.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-02] Milliwatt-threshold widely-tunable optical parametric oscillation in integrated chalcogenide microresonators
[Presentation Style] Online

*Zifu Wang[1], Jiaxin Zhao[1], Di Xia[1], Yufei Li[1], Liyang luo[1], Dong Liu[1], Bin Zhang[1], Zhaohui Li[1] (1. Sun Yat-sen Univ. (China))

[Presentation Style] Online

We demonstrate a widely-tunable optical parametric oscillation ranging from 1254 nm to 2088 nm in integrated chalcogenide microresonators with 1.2 milliwatt pump power threshold.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-03] Photonic Crystal-Based Higher Order Mode Pass Filter
[Presentation Style] Online

*Omnia Nawwar[1], Naoya Kuse[1,2] (1. Tokushima Univ. (Japan), 2. PRESTO (Japan))

[Presentation Style] Online

We propose a higher-order-mode pass filter with the simulated insertion loss of <1 dB and extinction ratio of >25 dB, which consists of a 1D photonic crystal with periodic elliptical holes.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-04] Silicon photonic crystal slow-light waveguide in a lattice-shifted perturbed kagome lattice
[Presentation Style] Onsite

*Deji Li[1], Kiyoto Takahata[1] (1. Waseda Univ. (Japan))

[Presentation Style] Onsite

Si photonic crystal slow-light waveguide with lattice-shifted structure in the perturbed kagome lattice is proposed. A group index of 60 with low-dispersion bandwidth of 5.5 nm is achieved with numerical calculation.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-05] Enhance Photoluminescence of MoS_2 by SiN_x Photonic Crystal Resonators

[Presentation Style] Online

*Tsan-Wen Lu[1], Huan-Yueh Chu[1], Shih-Yen Lin[2], Po-Tsung Lee[1] (1. National Yang Ming Chiao Tung University (Taiwan), 2. Academia Sinica (Taiwan))

[Presentation Style] Online

We study and realize different integrations between monolayer MoS_2 and SiN_x photonic crystal resonators. These integrations can produce the narrow and broadband photo-luminescence enhancements of MoS_2 by the band-edge and high *Q* cavity mode inside.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-06] Polarization Characteristics of Polaritonic BCS in $CsPbBr_3$ Microcavity

[Presentation Style] Onsite

*Yuta Moriyama[1], Yusuke Ueda[1], Tsukasa Hirao[1], Tomoya Tagami[1], Shun Takahashi[1], Kenichi Yamashita[1] (1. Kyoto Inst. of Tech. (Japan))

[Presentation Style] Onsite

We investigate the polarization state of BCS polariton condensates of a CsPbBr3 microcavity prepared by solution process. At the above-threshold excitation density, we observed condensation switching phenomenon between the two polarized polariton modes.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-07] Plasmonic Ring Resonator Glucose Sensor with Reduced Full width at Half Maximum

[Presentation Style] Online

*Soumya Kumari[1], Yogesh Kumar Verma[1], Saurabh Mani Tripathi[1] (1. Indian Institute of Technology Kanpur (India))

[Presentation Style] Online

A metal-insulator-metal ring resonator is reported for glucose sensing. Introduction of Si dielectric material in input bus-waveguide decreased FWHM to ~27 nm. Simulated average glucose sensitivity and figure-of-merit are 0.17 nm.L/g and 0.0063 L/g, respectively.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-08] Highly sensitive microdisk-laser sensor with meta-air-hole patterns

[Presentation Style] Onsite

*Haerin Jeong[1], Myung-Ki Kim[1] (1. Korea University (Korea))

[Presentation Style] Onsite

We demonstrate a microdisk-laser sensor with meta-air-hole patterns that improves the sensitivity by a factor of two to the external refractive-index compared to the unpatterned microdisk-laser when the volume ratio of meta-air-holes is 8%.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-09] MXene (Ti3C2TX) Surface Plasmon Resonance (SPR) in the Short-Wave Infrared (SWIR) wavelength

[Presentation Style] Online

*Han-na Kim[1], Da In Song[1], Young-Ho Jin[1], Changhoon Park[1], Chong Min Koo[2], Myung-Ki Kim[1] (1. Korea University (Korea), 2. KIST (Korea))

[Presentation Style] Online

MXene SPR, which is more sensitive than the conventional gold SPR at SWIR regime, is advantageous for measuring the refractive index of thin materials, was theoretically and experimentally confirmed.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-10] Microbubbles photothermally induced on sub-wavelength $FeSi_2$ discs

[Presentation Style] Onsite

*Kyoko Namura[1], Ayaka Hara[1], Motofumi Suzuki[1] (1. Kyoto Univ. (Japan))

[Presentation Style] Onsite

Photothermal conversion properties of $FeSi_2$ discs were used to generate water vapor microbubbles. The bubble size depended on the total heat generation because the disc size and the thermal diffusion length were comparable.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-11] Single Droplet Formation in the Ionic Liquid/Water Mixture by Optical Tweezers

[Presentation Style] Onsite

*Maho Tanaka[1], Yasuyuki Tsuboi[1], Ken-ichi Yuyama[1] （1. Osaka City University (Japan)）

[Presentation Style] Onsite

We demonstrate the formation of a single core-shell droplet by focusing a near-infrared laser beam into a ionic liquid/water mixture. The droplet was characterized by means of fluorescence imaging and Raman spectroscopic analysis.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-12] Optical manipulation of nanoparticles in tapered capillaries: application to the optical sorting of nanodiamonds

[Presentation Style] Onsite

*Christophe Pin[1], O Suzuki[1], Keiji Sasaki[1] （1. Hokkaido Univ. (Japan)）

[Presentation Style] Onsite

Liquid-filled tapered glass capillaries with few square-micrometer-large cross-sections are fabricated and used to enhance light-matter interactions between a guided laser beam and dispersed nanoparticles. Optical manipulation and sorting of nanodiamonds is demonstrated.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-13] "Sensing Kinetics of Ice Recrystallization through Plasmonic Nanoantennas"

[Presentation Style] Onsite

*Nu-Ri Park[1], Yedam Lee[2], Han-Na Kim[1], Sang Yup Lee[1], Dong June Ahn[1,2], Myung-Ki Kim[1] （1. KU-KIST Graduate School of Converging Sci. and Tech., Korea Univ. (Korea), 2. Department of Chemical and Biological Eng., Korea Univ. (Korea)）

[Presentation Style] Onsite

We directly observed the ice recrystallization in real-time within a space of tens of nanometers using plasmonic nanoantennas. At the same time, we were able to elucidate the mechanism of inhibition of ice recrystallization.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-14] Quest for chiral nanogap structures using topology optimization

[Presentation Style] Onsite

*Yamato Fukui[1], Atsushi Taguchi[1], Keiji Sasaki[1] (1. Hokkaido Univ. (Japan))
[Presentation Style] Onsite
Nanogap structures, widely used in the field of nanophotonics, are usually achiral, which have mirror image symmetry. We designed chiral nano-gap structures having selectivity against the handedness of circularly polarized light.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-15] Multifunctional Reflective Metalens in Broadband Visible Light Band
[Presentation Style] Online

*Aran Yu[1], Da In Song[1], Moohyuk Kim[1], Myung-Ki Kim[1] (1. Korea University (Korea))
[Presentation Style] Online
We demonstrate reflective metalens using silver and PMMA patterned nanoholes and experimentally confirmed that broadband metalenses efficiently focus with each focal length in the RGB wavelength. We expect compact-optics and meta-filter by combining those.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-16] Simple &precisely printed metasurface on fiber apex
[Presentation Style] Onsite

*Moohyuk Kim[1], Nu-Ri Park[1], Aran Yu[1], Myung-Ki Kim[1] (1. Korea Univ. (Korea))
[Presentation Style] Onsite
We demonstrate a simple yet efficient fabrication technique for integration of metasurface and optical fiber using nanohole patterned PMMA metasurface. We experimentally confirmed that the metasurface-integrated optical fiber can effectively control the wavefront.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-17] Design and Optimization of Epsilon-Near-Zero Multilayer Structures with Broadband Absorption Performance
[Presentation Style] Online

*Yuqing Wang[1], Jiaye Wu[1], Chenxingyu Huang[1], Ze Tao Xie[1], H. Y. Fu[2], Qian Li[1] (1. Peking Univ. (China), 2. Tsinghua Univ. (China))
[Presentation Style] Online
The absorption bandwidth of the AZO-TiO_2 structure is optimized from 483 nm to 628 nm by a modified genetic algorithm. This optimization is appropriate for both normally incident plane waves and obliquely incident polarized waves.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-18] Organic VCSEL Lattice Fabricated by Nanoimprint Lithography

[Presentation Style] Onsite

*Yuji Adachi[1], Tsukasa Hirao[1], Takuya Enna[1], Takaya Inukai[1], Shun Takahashi[1], Kenichi Yamashita[1] (1. Kyoto Inst. of Tech. (Japan))

[Presentation Style] Onsite

We examined a UV-nanoimprint technique as an accessible method to fabricate polariton lattices, and evaluated their luminescence properties. We observed the mode dispersion curves implying the polariton modes localized in the polariton lattice trap.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-19] Fabrication of Lead-Halide Perovskite Film with Two-Dimensional Photonic Lattice

[Presentation Style] Onsite

*Junki Morishita[1], Yuji Adachi[1], Takuya Enna[1], Shun Takahashi[1], Yohei Yamamoto[2], Kenichi Yamashita[1] (1. Kyoto Inst. of Tech. (Japan), 2. Univ. of Tsukuba (Japan))

[Presentation Style] Onsite

We aimed to fabricate lead-halogen perovskite microcavities with two-dimensional photonic lattices using simple UV nanoimprinting technique. Consequently, we can confirm that the perovskite crystals were fabricated periodically, and the two-dimensional lattice structure was successfully fabricated.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-20] Surface-doped ZnO/Ag/ZnO mesh electrodes for flexible OLEDs with superb efficiency

*Ho Jin Lee[1], Wanqi Ren[1], Na Hyun Kim[1], Hwi Geun Kim[1], Kang Ting[1], Tae Geun Kim[1] (1. Korea University (Korea))

Despite great progress in flexible and transparent electrodes, the efficiency of organic light-emitting diodes (OLEDs) is still low under mechanical deformation. Herein, high-efficiency TADF-based blue flexible OLEDs are demonstrated using surface-doped ZnO/Ag/ZnO mesh electrodes.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-21] III-V gain-block implanted continuous-wave hybrid silicon nanolaser with enhanced heat dissipation

[Presentation Style] Onsite

*Byoung Jun Park[1], Min-Woo Kim[2], Kyoung-Tae Park[2], You-Shin No[1,2], Myung-Ki Kim[1] (1. Korea Univ. (Korea), 2. Konkuk Univ (Korea))
[Presentation Style] Onsite
We demonstrate a silicon nanolaser operated as a continuous-wave at room temperature with very low threshold power through direct and efficient integration of a silicon photonic crystal nanocavity and a judiciously designed III-V gain block.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-22] Design of a quantum-dot single-photon source on a silicon nitride waveguide for efficient and indistinguishable photon generation
[Presentation Style] Onsite

*Natthajuks Pholsen[1,2], Yasutomo Ota[3,4], Ryota Katsumi[1,2], Yasuhiko Arakawa[4], Satoshi Iwamoto[1,2,4] (1. Res. Center for Advanced Sci. and Tech., The Univ. of Tokyo (Japan), 2. Inst. of Indus. Sci., The Univ. of Tokyo (Japan), 3. Department of Applied Physics and Physio-Informatics, Keio Univ. (Japan), 4. Inst. for Nano Quantum Info. Electronics, The Univ. of Tokyo (Japan))
[Presentation Style] Onsite
We design quantum-dot single-photon sources based on a defect-based photonic crystal cavity on a SiN waveguide with >90% efficiency. The defect region secures distance between etched airholes and quantum dots, expected to improve photon indistinguishability.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-23] Electromagnetic Shielding of Electrically-Insulating Ionic Solution
[Presentation Style] Onsite

*Jisung Kwon[1], Junpyo Hong[2], Aamir Iqubal[2], Chong Min Koo[2], Myung-Ki Kim[1] (1. Korea Univ. (Korea), 2. Korea Inst. of Sci. and Tech. (Korea))
[Presentation Style] Onsite
Electrically-insulative ionic solutions of KBr, NaCl, and $CaCl_2$ salts are employed as effective electromagnetic interference (EMI) shielding materials. Debye-Drude theoretical models is applied for illuminating the EMI shielding mechanism of ionic solution.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu8-24] Sidelobe-Suppressed Bessel Beam using Hologram
[Presentation Style] Onsite

*Jerin Geogy George[1], Yerragadda Guruvaiah[1], Shanti Bhattacharya[1] （1. IIT Madras (India)）
[Presentation Style] Onsite
We present the generation of a sidelobe suppressed Bessel beam (SBB) using a holographic technique. The peak intensity of the sidelobes of the generated SBB is about 70% less compared to a standard Bessel beam.

Poster Session | CLEO-PR2022 | Poster Session

C10. Optical Fiber and Waveguide Technologies

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3) (1F)

[P-CTu10-01] Development of yellow (575 nm) laser by single-mode double-clad structured Dy^{3+} -doped waterproof fluoro-aluminate glass fiber
[Presentation Style] Onsite

*Ayaka Koganei[1], Kenta Takahashi[1], Natsuho Nashimoto[1], Osamu Ishii[2], Masaaki Yamazaki[2], Yasushi Fujimoto[1] (1. Chiba Institute of Technology Univ. (Japan), 2. Sumita Optical Glass Inc. (Japan))

[P-CTu10-02] A Multimode Interference method for power combining and coupling tunable optical power in a single mode fiber
[Presentation Style] Onsite

*Kritarth Srivastava[1], Nitin Bhatia[1] (1. Indian Institute of Technology, Jodhpur (India))

[P-CTu10-03] Mode-Division (De)Multiplexing Combining Stark-Chirped Rapid-Adiabatic-Passage and Supersymmetry
[Presentation Style] Online

*David Viedma[1], Jordi Mompart[1], Verònica Ahufinger[1] (1. Universitat Autònoma de Barcelona (Spain))

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu10-01] Development of yellow (575 nm) laser by single-mode double-clad structured Dy^{3+} -doped waterproof fluoro-aluminate glass fiber
[Presentation Style] Onsite

*Ayaka Koganei[1], Kenta Takahashi[1], Natsuho Nashimoto[1], Osamu Ishii[2], Masaaki Yamazaki[2], Yasushi Fujimoto[1] (1. Chiba Institute of Technology Univ. (Japan), 2. Sumita Optical Glass Inc. (Japan))

[Presentation Style] Onsite

We have been developing a high-power, high-efficiency yellow laser using single-mode double-clad structured Dy^{3+}-doped waterproof fluoro-aluminate glass fiber. This technique will provide a solid-state yellow laser with compact and easy maintenance.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu10-02] A Multimode Interference method for power combining and coupling tunable optical power in a single mode fiber
[Presentation Style] Onsite

*Kritarth Srivastava[1], Nitin Bhatia[1] (1. Indian Institute of Technology, Jodhpur (India))

[Presentation Style] Onsite

We show that the input power of multiple launch fields in a square core multimode fiber can be combined, and continuously tuned to 0-6 dB of the input power by the phase control of inputs.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu10-03] Mode-Division (De)Multiplexing Combining Stark-Chirped Rapid-Adiabatic-Passage and Supersymmetry
[Presentation Style] Online

*David Viedma[1], Jordi Mompart[1], Verònica Ahufinger[1] (1. Universitat Autònoma de Barcelona (Spain))

[Presentation Style] Online

We achieve efficient (de)multiplexing for two multimode waveguides by combining Stark-Chirped Rapid-Adiabatic-Passage and Supersymmetry. The method allows to pump the excited modes of waveguides and can be extended to higher order systems.

Poster Session | CLEO-PR2022 | Poster Session

C12. Silicon Photonics

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3) (1F)

[P-CTu12-01] A Silicon Thermo-optic Switch With Sub-10 mW Switching Power And Sub-10 μ s Switching Time
[Presentation Style] Online

*Dongdong Lin[1], Binfeng Yun[1] (1. Southeast University (China))

[P-CTu12-02] High-Density Non-Hermitian Photonic Integrated Circuits
[Presentation Style] Online

*Yanxian Wei[1], Hailong Zhou[1], Yunhong Ding[2,3], Jianji Dong[1], Xinliang Zhang[1] (1. Huazhong university of science and technology (China), 2. Department of Photonics Engineering, Technical University of Denmark (Denmark), 3. SiPhotonIC ApS (Denmark))

[P-CTu12-03] A silicon micro-ring resonator with a curved directional coupler for wavelength-independent operation
[Presentation Style] Online

*Cheng-Hsuan Wu[1], Chih-Hsin Chen[1], Chin-Shih Huang[2], Hao-Chun Hsieh[2], Hung-Chun Pan[2], Yu-Fu Wu[2], Tai-Chi Yang[2], Yung-Jr Hung[1] (1. National Sun Yat-sen Univ. (Taiwan), 2. Wistron Corp. (Taiwan))

[P-CTu12-04] New Image Recognition Approach by Using Image Senser and Machine-Learning for Grating Coupler Alignment
[Presentation Style] Onsite

*Hongli Yu[1], Naoto Yoshimoto[1] (1. Chitose Institute of Science and Technology (Japan))

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu12-01] A Silicon Thermo-optic Switch With Sub-10 mW Switching Power And Sub-10 μ s Switching Time

[Presentation Style] Online

*Dongdong Lin[1], Binfeng Yun[1] (1. Southeast University (China))

[Presentation Style] Online

We demonstrated a spiral silicon waveguide optical switch with optimized pulse driving. The switching power and the switching time are 8.73 mW and 5 μs separately.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu12-02] High-Density Non-Hermitian Photonic Integrated Circuits

[Presentation Style] Online

*Yanxian Wei[1], Hailong Zhou[1], Yunhong Ding[2,3], Jianji Dong[1], Xinliang Zhang[1] (1. Huazhong university of science and technology (China), 2. Department of Photonics Engineering, Technical University of Denmark (Denmark), 3. SiPhotonIC ApS (Denmark))

[Presentation Style] Online

In this paper, we make use of the non-Hermitian system to construct high density integrated waveguide array. An extinct ratio of 15 dB is observed at a gap spacing of 400 nm.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu12-03] A silicon micro-ring resonator with a curved directional coupler for wavelength-independent operation

[Presentation Style] Online

*Cheng-Hsuan Wu[1], Chih-Hsin Chen[1], Chin-Shih Huang[2], Hao-Chun Hsieh[2], Hung-Chun Pan[2], Yu-Fu Wu[2], Tai-Chi Yang[2], Yung-Jr Hung[1] (1. National Sun Yat-sen Univ. (Taiwan), 2. Wistron Corp. (Taiwan))

[Presentation Style] Online

A asymmetric curved directional coupler (CDC) is designed to provide wavelength-independent response and arbitrary optical coupling ratio. The CDC-equipped micro-ring resonator enables an extinction ratio of 14±2 dB over the entire o-band wavelengths.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu12-04] New Image Recognition Approach by Using Image Senser and Machine-Learning for Grating Coupler Alignment

[Presentation Style] Onsite

*Hongli Yu[1], Naoto Yoshimoto[1] （1. Chitose Institute of Science and Technology (Japan)）
[Presentation Style] Onsite
New approach for grating coupler alignment. Hidden grating coupler is successfully visualized and alignment position prediction by using visible light, image sensor and machine learning. The accuracy of prediction is about 85% after machine learning.

C14. Advanced 2D and Nanocarbon Materials for Photonics and Energy

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3) (1F)

[P-CTu14-01] Graphene Thermal Emitters Directly Grown on Chips by Etching-Precipitation Method

[Presentation Style] Onsite

*YUI SHIMURA[1], Shinichiro Matano[1], Kenta Nakagawa[1], Suguru Noda[2], Hideyuki Maki[1,3]

(1. Keio Univ. (Japan), 2. Waseda Univ. (Japan), 3. Center for Spintronics Res. Network, Keio Univ. (Japan))

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu14-01] Graphene Thermal Emitters Directly Grown on Chips by Etching-Precipitation Method

[Presentation Style] Onsite

*YUI SHIMURA[1], Shinichiro Matano[1], Kenta Nakagawa[1], Suguru Noda[2], Hideyuki Maki[1,3] (1. Keio Univ. (Japan), 2. Waseda Univ. (Japan), 3. Center for Spintronics Res. Network, Keio Univ. (Japan))

[Presentation Style] Onsite

We have demonstrated a blackbody micro-emitter using etching-precipitation graphene that requires no transfer process. Long-lifetime and bright emission are achieved by using a bow-tie-shaped graphene. This graphene-based micro-emitter is expected to be applied to integrated photonics and optoelectronics.

Poster Session | CLEO-PR2022 | Poster Session

C17. Optical Sensors and Systems

Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3) (1F)

[P-CTu17-01] Study of Displacement Measurement using Self-coupling Signal of Quantum Dot Laser

[Presentation Style] Onsite

*shunnnosuke Imai[1], Daiki Sato[1], Ryoya Iwamoto[1], Norio Tsuda[1], Jun Yamada[1] (1. Aichi Institute of Technology (Japan))

[P-CTu17-02] Mid-IR Fiber Optic Sensing System Based on Fluoride Fiber Waveguide

[Presentation Style] Onsite

*Kenji Goya[1], Yoshiaki Nishijima[2], Shigeki Tokita[3], Ryo Yasuhara[4], Hiyori Uehara[4] (1. Akita Prefectural Univ. (Japan), 2. Yokohama National Univ. (Japan), 3. Osaka Univ. (Japan), 4. National Inst. for Fusion Science (Japan))

[P-CTu17-03] Noise Reduction by Differential Detection for Mid-infrared Laser Spectroscopy

[Presentation Style] Onsite

*Kyosuke Nagasaka[1], Atsushi Sugiyama[1], Naota Akikusa[1], Tadataka Edamura[1] (1. Hamamatsu Photonics K.K. (Japan))

[P-CTu17-04] Compact active hyperspectral imager for short wave infrared wavelengths

*Teemu Kaariainen[1], Timo Donsberg[1] (1. VTT Technical Research Centre of Finland Ltd (Finland))

[P-CTu17-05] Temperature-insensitive measurement of refractive index using a no-core fiber-based modal interferometer

[Presentation Style] Online

*tae yoon Kim[1], Junha Jung[1], Geun Weon Lim[1], Ju Han Lee[1] (1. University Of Seoul (Korea))

[P-CTu17-07] Dual Evanescent Waves in a Single Resonance: Innovative Applications for Fano Resonance Biosensors

[Presentation Style] Onsite

*Shu-Cheng LO[1,2], Sheng-Hann Wang[1], Ting-Wei Chang[1], Kuang-Li Lee[1], Ruey-Lin Chern[2], Pei-Kuen Wei[1] (1. Research Center for Applied Sciences, Academia Sinica (Taiwan), 2. Institute of Applied Mechanics, National Taiwan University (Taiwan))

[P-CTu17-09] Near-infrared Phase-detection Auto-focusing with Plasmonic Nanostructures

[Presentation Style] Online

*God Eun Seok[1], Yunkyung Kim[1] (1. Dong-A Univ. (Korea))

[P-CTu17-10] A Terahertz Metasurface based Refractive Index Sensor

[Presentation Style] Online

*Aruna Gandhi M S[1], NAGARAJAN NALLUSAMY[2], Rahul Singhal[2], Qian Li[1] (1. School of Electronic and Computer Engineering, Peking Univ. (China), 2. Optical Communication Lab, Department of Electrical and Electronics Engineering, BITS Pilani (India))

[P-CTu17-11] Study on improving the real-time performance of Self-Coupled Distance and Velocity Sensor
[Presentation Style] Onsite
*Daiki Sato[1], Yuto Higuchi[1], Norio Tsuda[1], Jun Yamada[1] （1. Aichi Institute of Technology (Japan)）

[P-CTu17-12] Visualizing the dynamic damping phenomenon in the thermal lensing of crystals by a nanoscale optical ruler
[Presentation Style] Online
Shou-Tai Lin[1], Guan-Yu Zhuo[2,3], Hsien-Yi Wang[4], *Ming-Che Chan[5] （1. Department of Photonics, Feng Chia University (Taiwan), 2. Institute of New Drug Development, China Medical University (Taiwan), 3. Integrative Stem Cell Center, China Medical University Hospital (Taiwan), 4. Medical Research Center, Chimei Hospital (Taiwan), 5. College of Photonics, national Yang-Ming Chiao-Tung University (Taiwan)）

[P-CTu17-13] Reflected-Phase Measurement of Azimuth-Rotated Guided-Mode Resonance Device Using Pohl Interferometer
[Presentation Style] Online
Cheng-Tsung Chang[1], *Jaturon Tongpakpanang[1], Wen-Kai Kuo[1] （1. National Formosa University (Taiwan)）

[P-CTu17-14] Near-infrared Sensing with a Stacked Photodiode
[Presentation Style] Onsite
*Hyunjoon Sung[1], Yunkyung Kim[1] （1. Dong-A Univ. (Korea)）

[P-CTu17-15] Forming Aerial Grid Points with AIRR by Use of Faced Half Mirrors
[Presentation Style] Onsite
*Kohei Kishinami[1], Kazunari Chiba[1], Kengo Fujii[1], Masaki Yasugi[1], Shiro Suyama[1], Hirotsugu Yamamoto[1] （1. Utsunomiya Univ. (Japan)）

[P-CTu17-16] High Sensitive Pixel with Covered Microlens for Quad Color Filter Array
[Presentation Style] Onsite
*Jae-Hyeok Hwang[1], Yunkyung Kim[1] （1. Dong-A Univ. (Korea)）

[P-CTu17-17] A Study on Pulse Measurement of Self-Coupled Laser Terminal Voltage Type Sensor Using Suction Modulation Method
[Presentation Style] Onsite
*Yusuke Iwata[1], Daiki Sato[1], Yuto Higuchi[1], Norio Tsuda[1], Jun Yamada[1] （1. Aichi Institute of Technology (Japan)）

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-01] Study of Displacement Measurement using Self-coupling Signal of Quantum Dot Laser
[Presentation Style] Onsite

*shunnnosuke Imai[1], Daiki Sato[1], Ryoya Iwamoto[1], Norio Tsuda[1], Jun Yamada[1] (1. Aichi Institute of Technology (Japan))

[Presentation Style] Onsite

We conducted research on signal processing of displacement sensors using the self-coupling effect of quantum-dot lasers.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-02] Mid-IR Fiber Optic Sensing System Based on Fluoride Fiber Waveguide
[Presentation Style] Onsite

*Kenji Goya[1], Yoshiaki Nishijima[2], Shigeki Tokita[3], Ryo Yasuhara[4], Hiyori Uehara[4] (1. Akita Prefectural Univ. (Japan), 2. Yokohama National Univ. (Japan), 3. Osaka Univ. (Japan), 4. National Inst. for Fusion Science (Japan))

[Presentation Style] Onsite

A side-polished sensor structures were embedded in a fluoride glass fiber for mid-infrared (IR) fiber evanescent wave spectroscopy, produced by means of a mechanical polishing process. Spectroscopic analyses of liquid and gas samples were successfully performed.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-03] Noise Reduction by Differential Detection for Mid-infrared Laser Spectroscopy
[Presentation Style] Onsite

*Kyosuke Nagasaka[1], Atsushi Sugiyama[1], Naota Akikusa[1], Tadataka Edamura[1] (1. Hamamatsu Photonics K.K. (Japan))

[Presentation Style] Onsite

Differential detection technique was applied to mid-infrared laser spectroscopy with use of developed wavelength swept/tunable quantum cascade laser. It was found that the noise reduction effect was 3.8 times higher than the method without differential detection.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-04] Compact active hyperspectral imager for short wave infrared wavelengths

*Teemu Kaariainen[1], Timo Donsberg[1] (1. VTT Technical Research Centre of Finland Ltd (Finland))
A compact active hyperspectral imager is presented. The imager uses a tunable short wave infrared supercontinuum light source and an imaging sensor for acquisition of hyperspectral images. The imager is demonstrated for material classification.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-05] Temperature-insensitive measurement of refractive index using a no-core fiber-based modal interferometer [Presentation Style] Online

*tae yoon Kim[1], Junha Jung[1], Geun Weon Lim[1], Ju Han Lee[1] (1. University Of Seoul (Korea))
[Presentation Style] Online
We demonstrate a temperature-insensitive refractive index (RI) sensor based on an SMF-NCF-SMF structure-based modal interferometer with a wave configuration. The RI measurement sensitivity of our proposed refractometer was ~-53.24nm/RIU with no temperature sensitivity (0 pm/˚C).

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-07] Dual Evanescent Waves in a Single Resonance: Innovative Applications for Fano Resonance Biosensors [Presentation Style] Onsite

*Shu-Cheng LO[1,2], Sheng-Hann Wang[1], Ting-Wei Chang[1], Kuang-Li Lee[1], Ruey-Lin Chern[2], Pei-Kuen Wei[1] (1. Research Center for Applied Sciences, Academia Sinica (Taiwan), 2. Institute of Applied Mechanics, National Taiwan University (Taiwan))
[Presentation Style] Onsite
Surface plasmon resonance (SPR) sensors take advantages of label-free, real-time and surface-sensitive detection. The SPR technology is widely used for studying binding kinetics of various biomolecules. However, the typical SPR only has an evanescent depth. In this work, we discover a new phenomenon in aluminum capped nanoslit array which possesses two distant evanescent depths in a single Fano mode. This dual-mode in a single resonance property makes the Fano resonance useful for some innovative biosensing applications, such as self-referencing SPR sensors which applied in measuring the bio-reaction.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-09] Near-infrared Phase-detection Auto-focusing with Plasmonic Nanostructures [Presentation Style] Online

*God Eun Seok[1], Yunkyung Kim[1] (1. Dong-A Univ. (Korea))
[Presentation Style] Online

For near-infrared phase-detection autofocusing, a plasmonic structure having metal-insulator-metal (MIM) stack arrays is suggested. The wavelength selectivity and dependency of incident angle of the MIM stack arrays is used for the auto-focusing performance and confirmed.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-10] A Terahertz Metasurface based Refractive Index Sensor [Presentation Style] Online

*Aruna Gandhi M S[1], NAGARAJAN NALLUSAMY[2], Rahul Singhal[2], Qian Li[1] (1. School of Electronic and Computer Engineering, Peking Univ. (China), 2. Optical Communication Lab, Department of Electrical and Electronics Engineering, BITS Pilani (India))

[Presentation Style] Online

The proposed dual-layer highly coupled patch metasurface terahertz sensor achieves a maximum sensitivity of 0.65 THz/RIU, figure-of-merit of 1.828 RIU^{-1} in the sample refractive-index from 1.6-1.7, with quality factor of 6.3 for the bio-chemical applications.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-11] Study on improving the real-time performance of Self-Coupled Distance and Velocity Sensor [Presentation Style] Onsite

*Daiki Sato[1], Yuto Higuchi[1], Norio Tsuda[1], Jun Yamada[1] (1. Aichi Institute of Technology (Japan))

[Presentation Style] Onsite

To improve the real-time performance of the self-coupled distance-velocity sensor, we realized a measurement using only one pulse within a single pulse.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-12] Visualizing the dynamic damping phenomenon in the thermal lensing of crystals by a nanoscale optical ruler [Presentation Style] Online

Shou-Tai Lin[1], Guan-Yu Zhuo[2,3], Hsien-Yi Wang[4], *Ming-Che Chan[5] (1. Department of Photonics, Feng Chia University (Taiwan), 2. Institute of New Drug Development, China Medical University (Taiwan), 3. Integrative Stem Cell Center, China Medical University Hospital (Taiwan), 4. Medical Research Center, Chimei Hospital (Taiwan), 5. College of Photonics, national Yang-Ming Chiao-Tung University (Taiwan))

[Presentation Style] Online

Dynamic thermal lensing of laser crystals has been observed under different conditions. The dynamic information can help to study the balance between driving force (pumping and thermal stress) and damping loss (cooling and lasing).

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-13] Reflected-Phase Measurement of Azimuth-Rotated Guided-Mode Resonance Device Using Pohl Interferometer
[Presentation Style] Online

Cheng-Tsung Chang[1], *Jaturon Tongpakpanang[1], Wen-Kai Kuo[1] (1. National Formosa University (Taiwan))

[Presentation Style] Online

In this paper, we report the reflected-phase measurement results of the GMR device using the Pohl interferometer. Fringe shifts of the interferogram caused by the abrupt phase change of the resonantly reflected beam were observed by rotating the azimuth angle of the GMR device and without altering the reflected interference beam position, and the fringe shift can be captured and calculated by a fixed position camera.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-14] Near-infrared Sensing with a Stacked Photodiode
[Presentation Style] Onsite

*Hyunjoon Sung[1], Yunkyung Kim[1] (1. Dong-A Univ. (Korea))

[Presentation Style] Onsite

For near-infrared sensing of CMOS image sensor, a pixel structure having stacked photodiode is suggested. The optical simulation confirms the suggested structure is useful for both visible and near-infrared imaging without thickening silicon.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-15] Forming Aerial Grid Points with AIRR by Use of Faced Half Mirrors
[Presentation Style] Onsite

*Kohei Kishinami[1], Kazunari Chiba[1], Kengo Fujii[1], Masaki Yasugi[1], Shiro Suyama[1], Hirotsugu Yamamoto[1] (1. Utsunomiya Univ. (Japan))

[Presentation Style] Onsite

We propose a novel optical system to form aerial images of grid points, by introducing faced mirrors to aerial imaging by retro-reflection. We have confirmed possibility of forming 2D multiple aerial imaging by ray-tracing simulations.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-16] High Sensitive Pixel with Covered Microlens for Quad Color Filter Array

[Presentation Style] Onsite

*Jae-Hyeok Hwang[1], Yunkyung Kim[1] （1. Dong-A Univ. (Korea)）

[Presentation Style] Onsite

A covered microlens structure is suggested for high sensitivity of CMOS image sensor with quad color filter (CF) array. We confirmed that the sensitivity of the suggested structure was increased by an optical simulation.

(Tue. Aug 2, 2022 6:00 PM - 8:00 PM Main Hall (1/3))

[P-CTu17-17] A Study on Pulse Measurement of Self-Coupled Laser Terminal Voltage Type Sensor Using Suction Modulation Method

[Presentation Style] Onsite

*Yusuke Iwata[1], Daiki Sato[1], Yuto Higuchi[1], Norio Tsuda[1], Jun Yamada[1] （1. Aichi Institute of Technology (Japan)）

[Presentation Style] Onsite

Distance measurement using the self-coupled effect of semiconductor lasers requires a linear change in oscillation wavelength.We proposed a novel modulation method for semiconductor lasers and performed measurements with a single pulse.