

POSTER SESSIONS

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Monday 29 August 2011

1730-1930 POSTER SESSION 1 (2700)

Room: Bayside Terrace, Level 2

CLEO Pacific Rim

Semiconductor and Electro-Optic Devices

2700-PO-1

Takehiro Fukushima¹, Koichiro Sakaguchi¹, Yasunori Tokuda¹

1. *Okayama Prefectural University, Japan*

Quality Factor of Laser Diode Beam Tailored by Lloyd's Mirror Interference

The quality factor of a laser diode beam tailored by Lloyd's mirror interference is numerically evaluated. A quality factor as low as 1.08 was obtained for the tailored beam, which was nearly circular in shape.

2700-PO-2

Warren McKenzie¹

1. *Australian National Fabrication Facility, Australia*

The Challenges Facing Open Access Nanofabrication Facilities

This paper explores the challenges faced when creating and operating genuinely open-access facilities, provides an introduction to the ANFF facilities and access mechanisms and describes how these facilities can benefit researchers requiring fabrication of semiconductor and electro-optic devices.

2700-PO-3

Yong Gon Seo^{1,2}, Kwang Hyeon Baik¹, Hoo-Young Song¹, Ji-Su Son Jihoon Kim¹, Kyunghwan Oh², Sung-Min Hwang¹

1. *Korea Electronics Technology Institute, Korea*
2. *Yonsei University, Korea*

Optical Properties of Green Light-Emitting Diodes Grown on r-Plane Sapphire Substrates

We have reported on demonstration of green LEDs on a-plane GaN templates which were grown on r-plane sapphire substrates and characterized the optical output power and the emission spectra.

2700-PO-4

T.E. Tzeng¹, K.Y. Chuang¹, K.D. Tzeng¹, C.H. Chang¹, **Tsong-Sheng Lay¹**

1. *Department of Photonics, National Sun Yat-Sen University, Taiwan*

Broadband InGaAs Quantum Dots-in-a-Well Solar Cells

BBBbroadband quantum dots solar cells with In_{0.1}Ga_{0.9}As quantum wells underneath the QDs are inserted to successfully reduce the strain effect on VOC, and p-type doping in the wells shows the enhancement in JSC.

2700-PO-5

Wanhua Zheng^{1,2}, Wenjun Zhou¹, Wei Chen¹, Anjin Liu¹, Hailing Wang¹, Aiyi Qi¹, Feiya Fu¹, Yufei Wang¹

1. *Nano-optoelectronics Lab, Institute of Semiconductors, CAS, China*
2. *State Key Laboratory on Integrated Optoelectronics, ISCAS, China*

Novel Lateral Cavity Surface Emitting Laser on Commercial Epitaxial Waveguide Wafer without DBR Layers

Novel lateral cavity surface emitting laser was realized on the commercial epitaxial wafer based on the photonic crystal band edge mode lateral resonance. Electrically driven single mode lasing action was obtained at room temperature

2700-PO-6

Yu-Shou Wang¹, Nai-Chuan Chen², Jenn-Fang Chen¹

1. *National Chiao Tung University, Taiwan*
2. *Chang Gung University, Taiwan*

Diffusion-controlled Effects of Luminescent Efficiency in InGaN GaN Light-Emitting Diodes

Temperature dependence of photoluminescence (PL) and time-resolved photoluminescence (TRPL) were used to investigate the recombination process in InGaN/GaN light-emitting diodes (LEDs). The results exhibited that the nonradiative recombination process can be explained by diffusion-controlled kinetic.

2700-PO-7

Shingo Ono¹, Mirai Ieda¹, Tatsuya Ishimaru¹, Noriaki Kawaguchi², Kentaro Fukuda², Toshihisa Suyama², Yuui Yokota³, Takayuki Yanagida³, Akira Yoshikawa³

1 *Nagoya Institute of Technology, Gokiso, Japan*
2 *Tokuyama Corporation, Japan*
3 *Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Japan*

Evaluation of NdF₃ Thin Films as a Vacuum Ultraviolet Photoconductive detector

We report on photoconductive detector based on NdF₃ thin films grown by PLD. NdF₃ thin film grown at 670 K exhibited the maximum photocurrent and the response below 180 nm in sensitivity spectrum.

High Power Laser Technology and High Energy Density Physics

2700-PO-8

Sungman Lee¹, **Hyunki Cha¹**

Korea Atomic Energy Research Institute, Korea

Laser Induced Fast Neutrons for Possible Activation Analysis of Explosive Materials

A laser-induced fast neutron generation system was developed and operated repetitively for the potential applications in activation analysis. The neutron yield was measured by using a fast-gating scintillation detector, a CR-39 detector, and a neutron activation of gold. A PGNA system was designed and tested for the laser-induced neutrons.

2700-PO-9

Zining Yang¹, Hongyan Wang¹, Qisheng Lu¹, **Weihong Hua¹**, Xiaojun Xu¹

1. *National University of Defense Technology, China*

Model of Diode Double-side Pumped Alkali Vapor Lasers

Based on published model for DPALs in single-side pumped configuration, we made some modifications to model the double-side pumped alkali lasers. By this model, a conceptual design for a 100kW Rb laser is made.

2700-PO-10

Go Imada^{1,2}, Hiroyuki Saitou³, Masataro Suzuki³, Wataru Masuda³

1. *Dept. Info. & Electron. Eng., Niigata Inst. Technol, Japan*
2. *Extreme Energy-Density Res. Inst., Nagaoka Univ. Technol, Japan*
3. *Dept. Mech. Eng., Nagaoka Univ. Technol, Japan*

Increase in Gain on TEA-CO₂ Laser Device with Supersonic Flow

The gain of a TEA-CO₂ laser with supersonic flow M = 2 is measured at 2.2 % /cm, which is 1.3 times as high as that obtained for the still laser gas at the room temperature.

Solid-State Laser and Other Lasers, and Laser Materials

2700-PO-11

Reza Salimi¹, Hassan Sameie¹, **Ali. A Sabbagh Alvani²**, Ali. A Sarabi¹, Manouchehr Khorasani², Mohammad A. Mokhtari¹, Farsi Yalda Ebrahimi¹, Mohammadreza Tahriri³

1. Faculty of Polymer Engineering & Color Tech., Amirkabir University of Technology, Iran
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3. Biomaterials Group, Faculty of Biomedical Engineering, Amirkabir University of Technology, Iran

Optical Characterization of the Novel Nanostructure Eu-doped Phosphor for Potential Application in LEDs

After excitation of the phosphors which is efficiently matched to LED applications, blue light emits due to $4f65d1(2D)^14f7(8S7/2)$ transition of Eu^{2+} . The effect of structural parameters on the optical properties was evaluated by luminescence spectroscopy.

2700-PO-12

Jianlei Wang¹, Xiaojin Cheng¹, Zhenhua Zhang¹, Lei Li¹, Xiangchun Shi¹, **Xiaolei Zhu¹**, Weibiao Chen¹

1. Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

Temperature-Dependent Performances of Diode-Pumped Yb:YAG Disk Lasers

The temperature-dependent performances of LD pumped Yb:YAG laser is investigated. The maximum output energy of 1.46J is obtained in experiment with the corresponding optical-optical efficiency of 48.7% when the pump energy is 3J.

2700-PO-13

Takeshi Hirai¹ Satoshi Hashimoto², Nobuhito Ohno³, Michio Matsumura⁴

1. College of Science and Engineering, Ritsumeikan University, Japan
2. Graduate School of Science, Osaka Prefecture University, Japan
3. Graduate School of Engineering, Osaka Electro-Communication University, Japan
4. Research Center for Solar Energy Chemistry, Osaka University, Japan

Amplified Spontaneous Emission from Organic Thin Film Crystals Grown from the Melts

Photoluminescence spectra of organic semiconducting thin film crystals [2-(4-tert-butylphenyl)-5-(4-biphenyl)-1, 3, 4-oxadiazole, etc.] grown from the melts have been investigated under high-density photo-excitation, suggesting the occurrence of amplified spontaneous emission from the organic thin film crystals.

2700-PO-14

Hsiao-Hua Wu¹, Jr-Yuan Juang¹, Wan-I Liu¹

1. Department of Physics, Tunghai University, Taiwan

Stable QML of SAM Based Picosecond Nd:GdVO₄ Lasers by Gain Modulation

Gain modulation was applied to semiconductor saturable absorber mirror based picosecond Nd:GdVO₄ lasers for achieving stable Q-switched mode locking and enhancing its peak power to 8 times higher than that operated at continuous-wave mode locking.

2700-PO-15

Alena Zavadilova¹, Vaclav Kubecek¹, Jean-Claude Diels², Jan Sulc¹

1. Czech Technical University in Prague – FNSPE, Prague
2. University of New Mexico, USA

Synchronously Intracavity Pumped Dual Pulse Optical Parametric Oscillator

We improved experimental setup of intracavity synchronously pumped optical parametrical oscillator, generating two independent trains of picosecond pulses at wavelength 1540 nm. The influence of external conditions on dual pulse generation was studied.

2700-PO-16

Andrew Lee¹, Jonas Jakutis-Neto^{1,2}, Helen Pask¹

1. MQ Photonics Research Centre, Department of Physics, Macquarie University, Australia
2. Instituto de Pesquisas Energeticas e Nucleares, Universidade de Sao Paulo, Brazil

Generation of Combs of Wavelengths in the Infrared and Visible using Cascaded Stimulated Raman Scattering in Potassium Titanyl Phosphate

We generate a comb of emission wavelengths in the near-infrared, and wavelength-tunable emission at up to five discrete wavelengths in the visible by applying cascaded stimulated Raman scattering in potassium titanyl phosphate.

2700-PO-17

Xiaoli Li^{1,2}, Andrew Lee¹, Helen Pask¹, James Piper¹, Yujing Huo²

1. MQ Photonics, Department of Physics and Astronomy, Macquarie University, Australia
2. Department of Electronic Engineering, Tsinghua University, China

330 mW CW Yellow Emission from Miniature Self-Raman Laser based on Direct HR-Coated Nd:YVO₄ Crystal

We report continuous-wave yellow emission from a miniature self-Raman laser using direct HR-coated Nd:YVO₄ crystal pumped by 3.8 W diode laser. Up to 330 mW output at 587.8 nm was obtained from an 18 mm long resonator.

2700-PO-18

Yu Lu¹, Zuochun Shen¹, Jianye Lu¹

1. National Key Laboratory of Tunable Laser Technology, Harbin Institute of Technology, Harbin 150001, China

Fresnel Lens Design to pump Cr/Nd:YAG Ceramic and Spectral Distribution at the Focal Plane

Based on the absorption spectrum of Cr/Nd:YAG ceramic, this paper addresses itself to the study of convex Fresnel lens focus solar light and choose spectrum. The design of Fresnel lens can be changed to obtain the desirable spectral distribution on focal plane. By way of simulation, the maximum absorb power density in six optimum design is 288.5W/cm², which is 3.2% -18.5% higher than absorb power density in six initial design based on purpose of obtaining the maximum power density.
ACOFT Presentation

2700-PO-19

Young-Ho Park¹, Myoung-Kyu Oh¹, Hoonsoo Kang¹

1. APRI, Gwangju Institute of Science and Technology, Korea

Characterization of a Homemade External-Cavity Diode Laser Employing Tapered Amplifier

An external-cavity diode laser employing tapered amplifier was built exploiting the high output power of tapered amplifier and the narrow spectral linewidth of external cavity configuration. An output power of 500 mW with the current of 2.5 A at the wavelength of 794 nm was achieved.

Applied Nonlinear Optics

2700-PO-20

Sheng-Min Wang¹, Siao-Shan Jyu¹, Wei-Wei Hsiang², Yinchieh Lai¹

1. Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan
2. Department of Physics, Fu Jen Catholic University, Taiwan

Demonstration Of 10ghz Asynchronous Mode-Locking In A Ytterbium-Doped Fiber Laser With Normal Dispersion

The asynchronous harmonic mode-locking technique is experimentally demonstrated on a Yb-doped fiber laser with normal cavity dispersion. Stable 10 GHz pulse trains with SMSR of 53 dB and 3 dB bandwidth of 1.15 nm have been achieved.

2700-PO-21

Daisuke Gunji¹, Masashi Hakamata¹, Ichiro Shoji¹, Tatsuo Fukui², Yasunori Furukawa²

1. Chuo University, Japan
2. OXIDE Corporation, Japan

Accurate measurements of the refractive indices of Mg-doped and undoped stoichiometric LiNbO₃ and LiTaO₃ by use of the minimum deviation method

We have measured the refractive indices of Mg-doped and undoped stoichiometric LiNbO₃ and LiTaO₃ at the wavelengths from 398 to 1064 nm with an accuracy of better than 1×10^{-4} by use of the minimum deviation method.

2700-PO-22

Zhi-Ming Hsieh¹, Shou-Tai Lin³, A. H. Kung^{1,2}

1. Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan
2. Institute of Photonics Technologies, National Tsing Hua University, Taiwan
3. Department of Photonics, Feng Chia University, Taichung, Taiwan

KHz multi-octave-spanning harmonics generated by quasi-phase matching

We report the generation of a kHz, five harmonic frequency comb by cascaded quasi-phase matched frequency mixing processes. This configuration permits the synthesis of a train of periodic sub-cycle subfemtosecond pulses in a compact setting.

2270-PO-23

W. Krolikowski¹, V. Roppo², Q. Kong³, Y. Sheng¹, **K. Kalinowski¹**

1. *Laser Physics Centre and Nonlinear Physics Centre, Australian National University, Australia*

2. *Department de Física i Enginyeria Nuclear, Universitat Politècnica de Catalunya, Spain*

3. *Department of Physics, Shanghai University, China*

Cerenkov Second Harmonic Generation in Nonlinear Crystals

We investigate the role of the fundamental beam width on Cerenko second harmonic generation in periodically poled crystal. We show that broader beam yields stronger signal and enhanced wavelength sensitivity of the emission process.

2700-PO-24

Hwan Hong Lim¹, Toshio Katagai², Takahiro Shimizu², Sunao Kurimura¹, Noriaki Ohmae³, Norikatsu Mio³, Ichiro Shoji²

1. *National Institute for Material Science (NIMS), Japan*

2. *Chuo University, Japan*

3. *University of Tokyo, Japan*

Optimal Pump Linewidth for Conversion Efficiency in cw Single-pass QPM SHG

We investigated normalized conversion efficiency depending on pump linewidth in cw single-pass QPM SHG. A maximum normalized SHG conversion efficiency is observed around a pump linewidth of 0.03 nm by additional SFG between longitudinal modes.

Infrared and THz Technology, and Astrophotonics

2700-PO-25

Hideto Shirai¹, Keiji Uzumi¹, Katsuya Fujita¹, Shyun Koshiba¹, Shunsuke Nakanishi¹, Hiroshi Itoh¹, Noriaki Tsurumachi¹

1. *Faculty of Engineering, Kagawa University, Japan*

THz radiation from Fabry-perot microcavity with GaP crystal in strong excitation condition

We investigated the characteristic of THz emission from microcavity structure with GaP crystal in the THz region under strong excitation and the two photon absorption properties in GaP crystal using optical pump terahertz probe spectroscopy.

2700-PO-26

Hidekazu Nakajima¹, Christopher T. Que¹, Elmer Estacio¹, Kohji Yamamoto¹, **Masahiko Tani¹**

1. *Research Center for Development of Far-Infrared Region, University of Fukui, Japan*

Enhancement of Terahertz Emission from InSb Using a Lens Coupler and Magnetic Field

THz emission enhancement from InSb pumped with 1.55- μ m femtosecond laser by simultaneous use of a lens-coupler and a magnetic field is investigated. A maximum amplitude enhancement of 74 times from a bare InSb is observed.

2700-PO-27

Kenji Wada¹, Shumpei Takeshita¹, Yuki Hono¹, Tetsuya Matsuyama¹, Hiromichi Horinaka¹

1. *Department of Physics & Electronics, Graduate School of Engineering, Osaka Prefecture University, Japan*

Stable Two-Wavelength Oscillation from External-Cavity Laser Diode Incorporating Cover Glass Etalons and Its Application to THz-Wave Generation

Stable two-wavelength oscillations from an external-cavity laser diode were achieved by incorporating cover glass etalons in the external-cavity. By focusing the two-wavelength outputs on a spiral photoconductive antenna, THz-waves were generated from the compact system.

2700-PO-28

Tomoharu Inoue¹, Kouichi Tsushima¹, Takashi Kataoka¹, **Kenichi Kasahara¹**, Naota Akikusa², Kazuue Fujita², Tadataka Edamura²

1. *Ritsumeikan University, Japan*

2. *Hamamatsu Photonics KK, Japan*

Small Optical Feedback-Induced Noise of 6.1- μ m Quantum Cascade Lasers

Relative intensity noise of a quantum cascade laser under optical feedback was first evaluated. Noise smaller than that of a conventional laser diode was due to a small line enhancement factor and long cavity length.

Integrated and Guided-Wave Optics and Thin Film Optics

2700-PO-29

Zilun Chen¹, Jing Hou¹, Shengping Chen¹, Zefeng Wang¹

1. *College of Optoelectronic Science and Engineering, National University of Defense Technology, China*

Low loss fusion splicing photonic crystal fibers and double cladding fibers

We demonstrate a novel method for low-loss splicing photonic crystal fibers (PCFs) and double cladding fibers (DCFs) by controlled hole collapse and tapering using a conventional fusion splicer.

2700-PO-30

Jinbiao Xiao¹, Saisai Xia¹, Wenliang Li¹, Xiaohan Sun¹

1. *Department of Electronic Engineering, Southeast University, China*

Characterization of Multiple-Slotted Silicon Wires with Angled Sidewalls Using Finite Element Method

The multiple-slotted silicon wires with angled sidewalls are analyzed by using a finite element method based on E-fields. The modal characteristics in quasi-TE and quasi-TM modes as function of the structural parameters are presented.

2700-PO-31

Liyang Liu¹, Yingfeng Li¹, Shaojun Wang¹, Lei Xu¹

1. *Key Lab for Micro and Nanophotonic Structures (Ministry of Education) Department of Optical Science and Engineering, School of Information Science and Engineering, Fudan University, China*

Low propagation loss binary ZrO₂-SiO₂ optical waveguides

ZrO₂-SiO₂ optical waveguides with low loss and large refractive index adjusting range were prepared by sol-gel process/dip-coating rapid thermal annealing treatment. Propagation loss is below 0.5 dB/cm even ZrO₂ concentration is over 40%.

2700-PO-32

A.T. Rosenberger¹, E.B. Dale¹, D. Ganta¹

1. *Department of Physics, Oklahoma State University, USA*

Cross-Polarization Mode Coupling in Whispering-Gallery Microresonators

When whispering-gallery modes of one polarization are driven, modes of the other polarization can also be excited. Our results suggest that scattering into a co-resonant mode of the orthogonal polarization is responsible.

2700-PO-33

Cheng-Chung Jaing¹, Ming-Chung Liu², Ping-Chi Feng¹, Chien-Jen Tang¹, Yeuh-Yeong Liou³, Bo-Huei Liao², Cheng-Chung Lee²

1. *Minghsin University of Science and Technology, Taiwan*

2. *National Central University, Taiwan*

3. *Chienkuo Technology University, Taiwan*

Thermal Expansion Coefficients of Obliquely Deposited LaF₃ Thin Films

Effects of columnar angles on the thermal expansion coefficients of LaF₃ films were investigated. The LaF₃ films with columnar microstructures were obliquely deposited on two types of glass substrates by means of resistive heating evaporation.

2700-PO-34

Duk-Yong Choi¹, Steve Madden¹, Rongping Wang¹, Barry Luther-Davies¹

1. *Laser Physics Centre, Australian National University, Australia*

The Impact of Thermal- and Photo-annealing of Chalcogenide Films for Optical Waveguides

Monday 29 August 2011 - Poster Session 1 continued

We present the application of photo-induced structural change and thermal annealing in chalcogenide films and its impact on waveguide performance. Light annealing is an efficient way for making the film homogeneous, hence for low-loss guides.

2700-PO-35

Vaclav Prajzler¹, Eduard Strilek¹, Oleksiy Lyutakov², Ivan Huttel², Jarmila Spirkova², Vlastimil Jurka³

1. Department of Microelectronics, Czech Technical University in Prague, Czech Republic
2. Institute of Chemical Technology, Czech Republic
3. Institute of Physics of the Academy of Sciences, Czech Republic

Polymer Optical Microring Filter for Passive Optical Network Applications

We report about of the Epoxy Novolak Resin polymer optical microring resonator (MR) filter operating at 1490 nm. The design was done by using FullWAVE software and MR was fabricated by using electron beam lithography.

ACOFT Presentation

2700-PO-36

Sakoolkan Boonruang¹, Waleed S. Mohammed²

1. National Elect & Computer Tech Ctr, National Science and Tech Development Agency, Thailand
2. School of Engineering, Bangkok University, Thailand

Integrated On-Axis Light Coupler for Surface Plasmon Resonance Using a Concentric Chirp Grating

A novel on-axis one-element polarization independent light in/out-coupling mechanism in a surface plasmon resonance (SPR) is proposed. The system with broad dynamic range ($\Delta n > 0.35$) utilizes an integrated high numerical aperture - concentric chirp grating.

Information Optics, Optical Storage and Displays

2700-PO-37

Jiarong Ji¹, Yansheng Song¹, Xianghua Feng¹, Wenhua Dou²

1. College of Opto-Electronic Science and Engineering, National University of Defense Technology, China
2. College of Computer National University of Defense Technology, China

Dependence of the Lifetime of Thermal Fixed Hologram on Grating Spacing in Photorefractive Crystals

We deduced the analytic expression of the lifetime of thermal fixed ionic holograms in photorefractive crystal. The result revealed that larger grating spacing was advantage for increasing the lifetime but had less influence on it.

2700-PO-39

Chikara Egami¹, Takuya Okawa¹, Kazuhiro Kuwahara¹

1. Shizuoka University, Japan

Jitter-Free Nanoparticles Optical Disk Storage

An optical storage disk composed of nanoparticles with buffer rings is proposed for high density recording without jitter. Nanoparticles doped with nonlinear organic dyes were used as recordable pits.

2700-CT-40

Ki-Mun Pak¹, Hyun-Hwan Choi¹, Yong-Hyub Won¹

1. Department of Electrical Engineering, Korea Advanced Institute of Science and Technology, Korea

Demonstration of Color Encrypted Computer-generated Hologram for an Error-free Optical ID Tag System

A color encryption method for APM-CGH for use in an error-free optical ID system is proposed. In a comparison with the conventional kinoform-CGH, it shows dramatically faster pattern generation times and more robust reconstruction capabilities.

ACOFT Presentation

2700-PO-41

Kosom Chaitavon¹, Sarun Sumriddetchajorn², and Jiti Nukeaw³

1. Photonics Technology Laboratory, National Electronics and Computer Technology Center, Thailand

2. Intelligent Devices and Systems Research Unit, National Electronics and Computer Technology Center, Thailand

3. College of Nanotechnology, King Mongkut's Institute of Technology, Thailand

Highly-Sensitive Optofluidics-based Single-Flow-Channel Refractometer Structure

This paper shows how only a single-channel microfluidic chip when deployed in our interferometric optofluidics-based refractometer can offer a very high sensitivity of 6.16×10^{-6} RIU/pixel suitable for sensitive bio and chemical sensing applications.

2700-PO-42

F.J. Wen¹, P. S. Chung¹, Y. Chen¹, Y.T. Chow¹

1. City University of Hong Kong, China
2. Shanghai Institute of Optics and Fine Mechanics, China

Novel Measurement Techniques using Mixed Circular and Cylindrical Phase Gratings

We propose an optical diffractive element which is composed of circular and cylindrical phase gratings, producing a mixed spectrum in a fractional Fourier transform system. It can be used in measuring distance, area and angle.

Optical Communications and Networking

2700-PO-43

Po-Hung Hsieh¹, **Wen-Shing Tsai¹**, Chun-Chia Weng¹, Hai-Han Lu²

1. Ming Chi University of Technology, Taiwan
2. National Taipei University of Technology, Taiwan

Optical Single-Sideband Modulation Based on FWM of SOA Using Electro-Absorption Laser

OSSB modulation scheme using FWM effects of SOA to achieve wavelength conversion. By properly adjust the phase shifter for phase difference between the two paths of electrical signal and transmit for a 25 km SMF.

2700-PO-44

T.P. Villena A.^{1,2}, **Arismar Cerqueira S. Jr.^{3,2}**, Marcelo L.F. Abbade⁴, H.E. Hernandez-Figueroa^{1,2}, H.L. Fragnito^{5,2}

1. Faculdade de Engenharia Elétrica e de Computação, UNICAMP, Brazil
2. Optics and Photonics Research Center, UNICAMP, Brazil
3. Faculdade de Tecnologia (FT), UNICAMP, Limeira-SP, Brazil
4. Faculdade de Engenharia Elétrica, PUC-Campinas, Brazil
5. Instituto de Física Gleb Wataghin, UNICAMP, Brazil

A New Optical Heterodyne Technique for Generating Multi-amplitude Microwave Signals

We propose a new technique that uses photodiode nonlinear response to convert two modulated optical signals into a single multi-amplitude microwave signal. Experimental tests successfully show the generation of 20 GHz quaternary amplitude-shift keying signals.
ACOFT Presentation

2700-PO-45

Jongdeog Kim^{1,2}, Munseob Lee¹, Sang-Heung Lee¹, **Seiyoung Lee¹**, Hakjeon Bang², Chang-Soo Park²

1. Electronics and Telecommunications Research Institute (ETRI), Korea
2. Gwangju Institute of Science and Technology (GIST), Korea

XG-PON1 OLT Transceiver With A Single-chip Burst-mode Receiver

We present the design and evaluation of a 10-gigabit small form factor pluggable transceiver with a prototype single-chip burst-mode receiver, a signal detection circuit, and a clock-data-recovery device for 2.5 Gbit/s upstream in the ITU-T G.987.2 recommendation.

2700-PO-46

P. C. Peng¹, H. H. Lu¹, C. H. Chang², W. L. Chuang¹

1. National Taipei University of Technology, Taiwan
2. National Chiayi University, Taiwan

40 GHz Tunable Microwave Photonic Filter based on Vertical-Cavity Surface-Emitting Laser

This study demonstrates a 40 GHz microwave photonic filter using a vertical-cavity surface-emitting laser. Experimental results indicate that the filter has a tuning range of over 31 GHz and a notch rejection of over 30 dB.

Laser Metrology and Remote Sensing

2700-PO-47

Qi Wang¹

1. Department of Physics, Huazhong University of Science & Technology, China

Roughness Measurement of Optical Quality Surface from a Single Image

I propose a method to estimate the roughness of an optical quality surface with Gaussian height distribution using a single image. The concept of the profile array of the image is defined, which contains information about the roughness of the surface. The standard deviation of the profile array can be calculated from the standard deviation of the central positions of a bright fringe in the image. Measurements on simulated images have been performed and the results are displayed and discussed. The method needs only one image and therefore it is immune to vibration. The method also has the same lateral resolution as multiple image methods.

2700-PO-48

Dukhyeon Kim¹, Sunho Park¹, Hai-Du Cheong¹, Wonseok Choi¹, Yong-Gi Kim², Moonsang Yun², Imkang Song²

1. Hanbat National University, Korea

2. Kongju National University, Korea

Can We Measure the Aerosol and Cloud Liquid Characteristics by Using Mie and Liquid-water Raman Lidar?

Liquid water Raman signal was measured and normalized by Mie and water vapor Raman signals. Here we have discussed the possibility of characterizing the aerosol and liquid cloud by using normalized liquid water lidar.

2700-PO-49

Gerry Bagtasa^{1,2}, Nobuo Takeuchi³, Hiroaki Kuze³

1. Institute of Environmental Science & Meteorology, University of the Philippines, Philippines

2. Natural Sciences Research Institute, University of the Philippines, Philippines

3. Center for Environmental Remote Sensing, Chiba University, Japan

Wavelet Denoising Applied to Cloud Base Height Determination from Portable Automated Lidar Data

The Portable Automated Lidar is capable of continuous monitoring of the atmosphere. Wavelet-based denoising is done to increase its observable range and a new cloud retrieval method is developed from the analysis of wavelet transform.

2700-PO-50

Shigeki Nishida¹, Yoshihiro Oshida¹

1. Nara National College of Technology, Japan

Development of an Optical Ruler for Range Finding Using a Binary Fresnel Hologram

We propose an optical ruler for range finding using a Fresnel hologram. It was fabricated using electron beam lithography. The fabricated hologram acted on a ruler for range finding with distance resolution of 20 millimeters.

ACOFT Presentation

2700-PO-51

Biju Cletus¹, William Olds¹, Emad L Izake¹, Peter M Fredericks¹, Esa Jaatinen²

1. Chemistry Discipline, Faculty of Science and Technology, Queensland University of Technology, Australia

2. Physics Discipline, Faculty of Science and Technology, Queensland University of Technology, Australia

Concealed Substance Identification using a Defocused Inverse Spatially Offset Raman Spectrometer

In this work we demonstrate a defocused inverse Spatially Offset Raman Spectrometer geometry with a modified data analysis method capable of making inverse SORS measurements from a distance greater than the focal distance of the collection lenses. With the defocused geometry we were able to detect acetaminophen, concealed inside a 2 mm thick plastic bottle, at a non-contact distance of 30 cm.

ACOFT Presentation

2700-PO-52

Youngkyu Park¹, Jun Gyu Park¹, and Kyuman Cho^{1,2}

1. Department of Physics, Sogang University, Korea

Constant-Phase Scanning Heterodyne Interferometer

A constant-phase scanning heterodyne interferometer scheme is introduced. The phase difference between the probe beam and reference beam is locked at the constant value by using a feedback control loop, by which nonlinearity and 1/ε-ambiguity of the phase measurements are minimized.

Laser Processing, Laser Microfabrication, and Industrial Applications

2700-PO-53

Yuan-Chin Lee^{1,2}, Shih Chao¹, Chun-Chieh Huang², Chin-Tien Yang²

1. Institute of Photonics Technologies, National Tsing Hua University, Taiwan

2. Industrial Technology Research Institute, Taiwan

Fabrication of a Dual-wavelength Optical Pickup Head for Laser Direct Writing

A dual-wavelength optical pickup head design for laser direct writing is designed, fabricated, and used for exposing some in-organic photo resist. A spot with 500nm in diameter and 120nm in depth is achieved for GeTeSnOx

ACOFT Presentation

2700-PO-54

I.A. Palani¹, K. Okazaki¹, D. Nakamura¹, M. Higashihata¹, T. Okada¹

1. Laser Laboratory, Graduate School of Information science and Electrical Engineering, Kyushu University, Japan

Characterization of Sb-Al Co-doped ZnO Nanowires Synthesized Using Nanoparticle-Assisted Pulsed-Laser Deposition

Sb-Al co-doped ZnO nanowires have been successfully synthesized using nanoparticles-assisted pulsed-laser deposition. These nanowires possess wurzite crystal structures with a sharp UV emission, highly suitable for optoelectronics applications.

2700-PO-55

Yuwen Duan¹, Martin Ams¹, Graham D. Marshall¹, Peter Dekker¹, M.J. Steel¹, Michael J. Withford¹

1. Centre for Ultrahigh bandwidth Devices for Optical, Macquarie University, Australia

Recent developments in dual-wavelength DFB waveguide lasers fabricated by femtosecond laser pulses

We report a dual-wavelength (DW) distributed feedback (DFB) waveguide laser based on a symmetric periodically sampled grating fabricated in Yb-doped phosphate glass, using the femtosecond laser direct-write technique.

2700-PO-56

Fei Jiang^{1,2}, Adrain Keating², Mariusz Martyniuk¹, Lorenzo Faraone¹, John Dell¹

1. EECE, The University of Western Australia, Australia

2. Mechanical and Chemical Engineering, The University of Western Australia, Australia

Fabrication Process for Optically Low Loss Si Cantilever Waveguide

Finite difference time domain was used to model through a waveguide consisting of a deflecting cantilever butt-coupling into a fixed waveguide. Effects towards fabrication of modulated structure revealed stress gradients in top Si layer.

Laser Chemistry, Biophotonics and Applications

2700-PO-57

Nam Hyun Cho¹, Unsang Jung¹, Suhwan Kim¹, Jeehyun Kim¹

1. Kyungpook National University, Korea

Next-generation Otitis Media Diagnosis Method by Oscope type Optical Coherence Tomography (OCT)

OCT (Optical Coherence Tomography) is an optical imaging method that can real-time and non-invasively acquire detailed images of in vivo tissues using optical interference phenomenon. But traditional OCT system has been developed for observing relatively big objects. We developed an otoscope type OCT as a next-generation middle ear diagnosis method for early diagnosis.

2700-PO-58

Song-Hee Han¹, Man Minh Tan², Yonghoon Lee²

1. Division of Liberal Arts and Science, Mokpo National Maritime University, Japan

2. Department of Chemistry, Mokpo National University, Japan

3. Department of Chemistry, Mokpo National University, Japan

Feasibility Study for Classification of Sun-Dried Sea Salts by Laser-Induced Breakdown Spectroscopy

We have investigated the feasibility of laser-induced breakdown spectroscopy (LIBS) for classification of sun-dried sea salts. The LIBS spectra of various sun-dried sea salts from 11 provenances were recorded in the wavelength region between 760 nm and 800 nm.

2700-PO-59

Ryosuke Tanaka¹, Takeshi Yasui^{1,2}, Shu-ichiro Fukushima¹, Tsutomu Araki¹

1. Graduate School of Engineering Science, Osaka University, Japan
2. Institute of Technology and Science, The University of Tokushima, Japan

In Vivo Observation of Skin Burn Using Collagen-Sensitive Second-Harmonic-Generation Microscopy

We applied collagen-sensitive second-harmonic-generation (SHG) microscopy for in vivo assessment of skin burn in animal model. Characteristic structural change of collagen fiber was clearly visualized in SHG image depending on a degree of burn.

2700-PO-60

Leo Matsuoka¹, Masashi Hashimoto¹, Keiichi Yokoyama¹

1. Japan Atomic Energy Agency, Japan

Narrow-Band Regenerative Amplifier for Momentum Imaging Spectroscopy of Molecules

We developed a Ti:Sapphire narrow-band regenerative amplifier for molecular spectroscopy. The gain bandwidth was narrowed to ~ 0.7 cm⁻¹ in the cavity. With 1.1-mJ pumping, mode-locked seed pulses were amplified to ~ 25 μ J at 1-kHz repetition.

2700-PO-61

Masato Ohmi¹, Motomu Tanigawa¹, Yuki Wada¹, Masamitsu Haruna¹

1. Yamada-Oka, Suita, Japan

Dynamic Analysis for Internal Mental Sweating of a Group of Eccrine Sweat Glands by Optical Coherence Tomography

We demonstrate dynamic OCT analysis of mental sweating of a group of eccrine sweat glands. The sweating dynamics is tracked simultaneously for nineteen sweat glands by time-sequential piled-up en-face OCT images with the frame spacing of 3.3 sec. Strong non-uniformity is observed in mental sweating where the amount of excess sweat is different for each sweat gland although the sweat glands are adjacent to each other. The non-uniformity should be necessary to adjust as precisely the total amount of excess sweat as possible through the sympathetic nerve in response to strength of the stress.

2700-PO-63

Yi-Chun Chen¹, Huei-Jyuan Pan¹, Li-Wei Chu², Chung-Shi Yang², **Chau-Hwang Lee^{1,3}**

1. Research Center for Applied Sciences, Academia Sinica, Taiwan
2. Center for Nanomedicine Research, National Health Research Institutes, Taiwan
3. Institute of Biophotonics, National Yang-Ming University, Taiwan

An Image Processing Algorithm to Tackle Noisy Point Spread Functions in 3D Intracellular Particle Tracking

We developed an algorithm that combines wavelet denoising and azimuthally averaging of point spread functions (PSFs) to achieve 3D particle tracking with noisy background. This algorithm provides positions of single quantum dots in living cells.

2700-PO-64

M. Pollnau¹, N. Ismail¹, K. Wörhoff¹, L.-P. Choo-Smith², A. C. Baclig³, P. J. Caspers³, G. J. Puppels³, A. Driessen¹, R.M. de Ridder¹

1. Integrated Optical MicroSystems Group, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands
2. Institute for Biodiagnostics, National Research Council Canada, Canada
3. Center for Optical Diagnostics and Therapy, Department of Dermatology, Erasmus Medical Center, The Netherlands

On-chip Raman Spectrometer for the Detection of Dental Caries

We measure Raman spectra of teeth using an integrated arrayed-waveguide-grating spectrometer fabricated in silicon-oxynitride technology. The results represent a step towards the realization of compact, hand-held, integrated spectrometers for the detection of early dental caries.

2700-PO-65

Jang Hyuk Lee¹, Dae Sik Choi¹, Dong Hoon Song¹, Eun Hee Cho², Sang-Mo Shin², Myoung-Kyu Oh³, **Do-Kyeong Ko^{1,3}**

1. Graduate Program of Photonics and Applied Physics, Gwangju Institute of Science and Technology, Korea
2. Graduate program of Medical System Engineering, Gwangju Institute of Science and Technology, Korea
3. Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Korea

Dual-color Nonlinear Optical Microscope Imaging and its Applications

A photonic crystal fiber(PCF) based dual-color nonlinear microscope that combines coherent anti-Stokes Raman scattering(CARS) microscopy and two-photon excitation fluorescence(TPEF) microscopy was developed and applied to imaging of various samples using a femtosecond laser.

2700-PO-66

In-Sik Kim¹, Sung In Hwang¹, Donghoon Song¹, **Do-Kyeong Ko^{1,2}**

1. School of Photon Science and Technology, Gwangju Institute of Science and Technology, Korea
2. Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Korea

On-axis Spiral Phase Contrast Microscopy with Femtosecond Light Source

We demonstrate that enhancement of optical image can be achieved with the femtosecond field by redirecting a DC part of the object image with a spiral phase plate.

2700-PO-67

Sang-Won Lee¹, Hyun-Woo Song¹, Jae Du Cho², Chang-Seok Kim Bong-Kyu Kim¹, Moon-Yuon Jung¹, Seung-Hwan Kim¹

1. Electronics and Telecommunications Research Institute, Japan
2. Pusan National University, Japan

Fourier Domain Optical Coherence Tomography for Ophthalmology using 800-nm Wavelength-Swept Laser: Preliminary Study

In this preliminary study, we constructed an 800-nm Fourier-domain/swept-source optical coherence tomography (FD/SS-OCT) for ophthalmology and obtained in vivo retinal OCT image of a healthy volunteer with an acquisition speed of 2.0 fps (1,000 A-lines/frame).

Fiber Amplifiers, Lasers, Sensors and Devices

2700-PO-68

Tian Jiang¹, Xiang-Ai Cheng¹

1. College of Photoelectric Science and Engineering, National University of Defense, Japan

Study of Ring Damage Phenomenon of CCD Irradiated by Ultrashort Pulse

To study the mechanism of ring damage phenomenon of array CCD irradiated by ultrashort pulsed Laser, it is found that the camera operated in the defocussing state is the main reason of ring damage phenomenon.

ACOFT Presentation

2700-PO-69

Bing He^{1,2}, Jun Zhou^{1,2}, Zhen Li^{1,2}, Yuhao Xue^{1,2}, Jingxing Dong^{1,2}, Yunrong Wei^{1,2}, Qihong Lou^{1,2}

1. Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China
2. Shanghai Key Laboratory of All solid-state Laser and Applied Techniques, China

Impact of Phase Perturbation on Passive Phase Locking of Fiber Laser Array

The phase perturbation of passive phase locking of fiber laser array is studied. Stable interference fringes with high contrast ratio can be still obtained even at modulation frequency of about 50 kHz

ACOFT Presentation

2700-PO-70

Young Ho Kim¹, Seong Jun Park¹, Kwan Seob Park¹, Sie-Wook Jeon¹, Chang-Soo Park¹, Byeong Ha Lee¹

1. School of Information and Communications, Korea

Simultaneous Measurements of Temperature and Refractive Index by Using Two-mode Fiber Interferometry

Fiber-optic interferometer probe based on two-mode fiber (TMF) is proposed and fabricated for simultaneous measurements of surrounding temperature and refractive index of liquid. The phase change of the reflection spectrum of the proposed probe is related only to the temperature variation, while the intensity change depends only on the refractive index variation.

2700-PO-71

Hyunmin Park¹, Kwang-Hoon Ko¹, Yong-Ho Cha¹, Jaemin Han¹, Gwon Lim¹, Taek-Soo Kim¹, Do-Young Jeong¹, Yong Gi Kim²

1. Quantum Optics Division, Korea Atomic Energy Research Institute, Korea
2. Department of Physics, Kongju National University, Korea

A Pulsed Diode-Oscillator Fiber-Amplifier with Wavelength Tunable Fourier-transform Limited Linewidth

We developed a single-frequency wavelength-tunable pulsed laser with Fourier-transform limited linewidth using the diode-oscillator fiber-amplification. The output power and spectral bandwidth after the final amplification using 40- μm core Yb-PCF fiber were measured and analysed.

2700-PO-72

Albert Canagasabay^{1,2}, Andrew Michie^{1,2}, **John Canning¹**, John Holdsworth³, Simon Fleming², Hsiao-Chuan Wang^{1,2}, Mattias L. Åslund¹

1. Interdisciplinary Photonics Laboratories (iPL), School of Chemistry, University, Australia
2. Institute of Photonics and Optical Science (IPOS), School of Physics University, Australia
3. SMAPS, University of Newcastle, Australia

A Comparison of Michelson and Mach-Zehnder Interferometers for Laser Linewidth Measurements

The performances of the Michelson (MI) and Mach-Zehnder interferometers (MZI) are compared for laser linewidth measurement with the delayed self-heterodyne technique. Voigt fitting is used to extract the Lorentzian and Gaussian components for the MZI and MI with Faraday mirrors and also standard gold mirrors. The MI with Faraday mirrors provides a measurement with significantly lower error, owing to the elimination of noise associated with random polarisation drifts.

2700-PO-73

Yu-Hsin Hsieh¹, Nan-Kuang Chen²

1. Department of Electro-Optical Engineering, National United University, Taiwan
2. Optoelectronics Research Center, National United University, Taiwan

Micro Sagnac loop interferometer based on a sphere-end hollow-core optical fiber

We demonstrate an ultracompact and robust micro Sagnac loop interferometer by splicing the end-sphered hollow-core fiber against single mode fiber. The device length is less than 450 μm and the extinction ratio can be above 29dB.

2700-PO-74

Lili Gui¹, Xiaosheng Xiao¹, **Changxi Yang¹**, Xin Yang², Jinsong Zhu², Xiao Li³, Hongwei Zhu³

1. State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instruments, Tsinghua University, China
2. National Center for Nanoscience and Technology, China
3. Key Laboratory for Advanced Manufacturing by Materials Processing Technology, Department of Mechanical Engineering, Tsinghua University, China

Observation of Various Bound Solitons of a Fiber Laser with Carbon Nanotubes and Graphene as Saturable Absorbers

Both in-phase and anti-phase two-soliton bound states were observed in a carbon-nanotube based mode-locked fiber laser. This paper also reports preliminary results of bound states with graphene as the saturable absorber for the first time.

2700-PO-75

Paul Jansz¹, Graham Wild¹, Steven Richardson¹, **Steven Hinckley¹**

1. Photonics Research Laboratory, School of Engineering, Edith Cowan University, Australia

Simulation of Optical Delay Lines for Optical Coherence Tomography

We present an analytical model used to simulate different optical delays in time domain optical coherence tomography. Its primary purpose is to compare conventional moving

optical delay lines to quasi-stationary and stationary optical delay lines.
ACOFT Presentation

2700-PO-76

Paulo Antunes^{1,2}, Rui Travanca³, Humberto Varum³, **Paulo André^{1,2}**

1. Instituto de Telecomunicações, Campus de Santiago, Portugal
2. Departamento de Física, Campus de Santiago, Portugal
3. Departamento de Engenharia Civil, Campus de Santiago, Portugal

Dynamic Characterization of a Radio Communication Tower with a FBG Based Accelerometer

The dynamic monitoring of a tower for mobile communications with 50 meters high using a bi-axial optical accelerometer is reported. The resonant frequencies for the first modes were obtained, being consistent with the expected values.

2700-PO-77

Shailendra K. Varshney¹, **Bhagyalaxmi Behera¹**, Annesha Maity¹, Raja Datta¹

1. Department of E&ECE, Indian Institute of Technology, India

Designing Bend-limited Large Mode Area Multi-Core Optical Fibers

We present design principles and constraints on bend-limited large-mode-area multi-core optical fibers. By introducing an extra air-hole ring in the cladding or trench, the bend losses can be reduced despite maintaining single-mode operation and large-mode-area.
ACOFT Presentation

2700-PO-78

Jiafang Bei¹, Heike Ebendorff-Heidepriem¹, Roger Moore¹, Tanya Monro¹

1. Institute for Photonics & Advanced Sensing and School of Chemistry & Physics, Australia

Fluorindate Fibres With Reduced Loss in the Mid Infrared Spectral Region: A Study of the Glass Melting and Fibre Preparation Conditions

The optimization of a fluorindate glass preparation and preform fabrication has been investigated, which led to the reduction of the water content and fibre loss. The improvement of fluorindate glass system enables longer wavelength and high power delivery laser devices fabrication.
ACOFT Presentation

2700-PO-79

Hou-Ren Chen¹, Chih-Hsuan Wu¹, Kuei-Huei Lin², **Jo-Yi Cheng²**, Hsiao-Hua Wu³, Wen-Feng Hsieh¹

1. Department of Photonics, National Chiao Tung University, Taiwan
2. Department of Science, Taipei Municipal University of Education, Taiwan
3. Department of Physics, Tunghai University, Taiwan

High-Repetition-Rate Passive Harmonic Mode-Locking in an SOA-Based Fiber Laser with Normal Dispersion

Harmonic mode-locking is operated in an 18-m figure-8 laser cavity having SOA gain medium at 1060 nm under normal dispersion. We can tune the repetition rate from 0.336 to 1.75 GHz by adjusting intracavity polarization at 100 mA pump.

2700-PO-79B

Hae Won Jung¹, Seoung Hun Lee¹, Kyong Hon Kim¹, Byeong Joo Lee², Goo Hwan Jeong², Han Young Yu³

1. Department of Physics, Inha University, Korea
2. Dept. of Advanced Materials Science & Engineering, Kangwon National University, Korea
3. ETRI, 161 Gajeong-dong Yuseong-gu, Korea

Graphene Thickness-Dependent Q-Switched Fiber Lasers

Graphenes of a couple of different thicknesses, both in a range of 10~20 layers, were tested as saturable absorbers for passively Q-switched erbium-doped fiber lasers. It was observed that the thin graphene provided a Q-switched pulse output of higher peak power, shorter pulse width, and higher repetition rate than the thick graphene.
ACOFT Presentation

IQEC

Quantum Optics

2700-PO-80

Byoung Ham¹

1. Inha University, Korea

Matched Pulse in Solid by Nondegenerate Four-Wave Mixing in an Ultralow Light Regime

Delayed nondegenerate four-wave mixing signals in a ultraslow light regime of rare-earth doped crystal has been observed, where the nondegenerated four-wave mixing signal copropagates along with the ultraslow probe pulse forming matched ultraslow light.

2700-PO-81

Yong-Chun Liu¹, Qihuang Gong¹, Bei-Bei Li¹, Xue-Feng Jiang¹, Yan Li¹, Yun-Feng Xiao¹

1. State Key Lab for Mesoscopic Physics, Department of Physics, Peking University, China

Position-Insensitive Photon Turnstiles in a Diamond Nanocrystal - Microcavity System

We find that Rayleigh Scattering plays a significant role in the photon transportation in a CEQD system where a single nitrogen-vacancy center is coupled to a whispering-gallery microcavity. The system can function as high-efficiency and position-insensitive photon turnstiles.

2700-PO-82

Akihiro Yamaguchi^{1,2}, Holger F. Hofmann^{1,2}

1. Hiroshima University, Japan

2. JST, CREST, Japan

Analysis of Quantum Correlations in the Light-Atom Interaction using a Time Domain Model of Light Field Propagation

We analyze the interaction of arbitrary quantum states of light with a single atom in free space using a local interaction with a single mode and a discrete model of light field propagation.

2700-PO-83

Alexei Filinkov², **Ian G. Fuss**¹

1. School of Electrical and Electronic Engineering, University of Adelaide, Australia

2. School of Mathematical Sciences, University of Adelaide, Australia

A Rigorous Description of Optical Phase

We represent the phase of an optical field by an operator valued distribution thus enabling a rigorous analysis of its statistics and new approaches to its approximation and measurement.

ACOFI Presentation

2700-PO-84

Masataka Iinuma¹, Yutaro Suzuki¹, Gen Taguchi¹, Yutaka Kadoya¹, Holger F. Hofmann¹

1. ADSM Hiroshima University, Japan

A Method for Weak Measurement of Photon Polarization Robust Against Experimental Imperfections

We realized a simple optical weak measurement of diagonal (PM) polarization of photons by interference between the horizontal and vertical polarization components. This measurement can achieve small back-action even at low visibilities of the interference.

2700-PO-85

Yutaro Suzuki¹, Masataka Iinuma¹, Tomonori Okazaki¹, Gen Taguchi¹, Yutaka Kadoya¹, Holger Hofmann^{1,2}

1. Graduate school of Advanced Sciences of Matter, Hiroshima University, Japan

2. JST, CREST, Japan

Experimental Investigation of the Role of Measurement Uncertainties in the Violation of Leggett-Garg Inequalities

We show that the violation of Leggett-Garg inequalities can be confirmed by intermediate measurements of arbitrary strength if both measurement resolution and back-action uncertainties are taken into account.

Quantum Science in Atoms, Molecules and Solids

2700-PO-86

Daniel L. Creedon¹, Yarema Reshitnyk², Jean-Michel le Floch¹, Warrick Farr¹, John M. Martinis³, Tim L. Duty^{2,4}, **Michael E. Tobar**¹

1. ARC Centre of Excellence for Engineered Quantum Systems, School of Physics, University of Western Australia, Australia

2. ARC Centre of Excellence for Engineered Quantum Systems, School of Mathematics & Physics, University of Queensland, Australia

3. Department of Physics, University of California, USA

4. School of Physics, The University of New South Wales, Australia

Sapphire Whispering Gallery Mode Resonators at Milli-Kelvin Temperature

We report the cool down of a single crystal sapphire whispering gallery mode resonator to as low as 25 mK, and to low excitation strengths at microwave frequencies to that of a single photon. High Q-factors are obtained of order one billion.

Cold Atoms and Molecules

2700-PO-87

S Jose^{1,2}, **Prince Surendran**^{1,2}, L Krzemien^{1,2}, S Whitlock^{1,2}, M Singh^{1,2}, P Hannaford^{1,2}, A Sidorov^{1,2}, R Mclean^{1,2}

1. ARC Centre of Excellence for Quantum-Atom Optics, Australia

2. Centre for Atom Optics and Ultrafast Spectroscopy, Swinburne University of Technology, Australia

Trapping of Ultracold Atoms in a 10- μ m-Period Permanent Magnetic Lattice

We report the realization of trapping of 87Rb $|F=1, m_F=-1\rangle$ atoms at temperature of 1-2- μ K in a 10- μ m-period 1D magnetic lattice constructed from a TbGdFeCo magnetic microstructure on an atom chip.

2700-PO-89

Arif Ullah¹, Maarten Hoogerland¹

1. Department of Physics, University of Auckland, New Zealand

Investigation of fractional resonant effects in an atom optics delta-kicked rotor

We are presenting a series of experiments describing the fractional resonant effects, and the dependence of energy of quantum resonances on the pulse period, when the atoms are exposed to short pulses of light.

2700-PO-90

Ju-Kuei (Ru-Gway) Wu¹, Sean Hodgman¹, Andrew Manning¹, Mattias Johnsson¹, Robert Dall¹, Andrew Truscott¹

1. Research School of Physics and Engineering, The Australian National University, Australia

Using Correlation Measurements to Probe Amplified Matter Waves and Bose-Einstein Condensate Formation

We performed correlation measurements using single atom detection offered by metastable helium. With this we have demonstrated second-order coherence of amplified matter waves, and investigated the onset of coherence during the formation of Bose-Einstein condensates.

2700-PO-91

A.J. McCulloch¹, D.V. Sheludko¹, R. E. Scholten¹

1. ARC Centre of Excellence for Coherent X-ray Science, School of Physics, the University of Melbourne, Australia

Emitance measurements of shaped electron bunches from cold atoms

Cold electrons extracted from laser cooled atoms have both the spatial coherence and high current required for picosecond molecular scale imaging. Similarly, sources of cold ions provide the opportunity of ion beam milling with unprecedented resolution. Here we use arbitrary and real-time control of the electron bunch shape to measure the low emitance of electrons from a cold atom source, thus demonstrating the unique combination of bunch shaping and high transverse coherence of these novel sources.

2700-PO-92

V. Ahufinger^{1,2}, Yu. Loiko^{1,3}, R. Corbalán¹, G. Birkel⁴, J. Mompart¹

1. Departament de Física, Universitat Autònoma de Barcelona, Spain
2. Institució Catalana de Recerca i Estudis Avançats, Lluís Companys 23, Spain
3. Institute of Physics, National Academy of Sciences of Belarus, Belarus
4. Institut für Angewandte Physik, Technische Universität Darmstadt, Germany

Filtering of Matter-wave Vibrational States via Spatial Adiabatic Passage

We discuss filtering of vibrational states via spatial adiabatic passage and its applications for quantum tomography and engineering of atomic Fock states that, eventually, could be used for tunneling-assisted evaporative cooling.

Quantum Information and Cryptography

2700-PO-93

Hoonsoo Kang¹, Bongjune Kim^{1,2}, Young Ho Park¹, Cha Hwan Oh², Inwon Lee¹

1. Quantum optics Laboratory, Advanced Photonics Research Institute, GIST, Korea
2. Department of Physics, Hanyang University, Korea

Phase-Controlled Switching By Interference Between Incoherent Fields In A Double- λ System

We showed experimentally interference could be occurred between incoherent lights in a double $-\lambda$ transition implemented with rubidium atomic vapor. We suggested optically cryptic information could be delivered by the phase-controlled switching with incoherent fields in a double $-\lambda$ system.

2700-PO-94

Austin Lund¹

1. Centre for Quantum Dynamics, Griffith University, Australia

Efficient Quantum Computing With Weak Measurements

We show that constraining a quantum computing architecture to low strength measurement does not introduce an inefficient overhead provided non-local measurements are allowed. With only local measurements an inefficient overhead must be introduced.

2700-PO-95

Holger F. Hofmann^{1,2}

1. Hiroshima University, Japan
2. JST, CREST, Japan

Characterization of Decoherence in a Quantum Channel using Weak Measurements

It is shown that weak measurements can determine the total amount of incoherent noise in quantum state transmissions through a quantum channel. Decoherence effects can then be identified efficiently without complete process tomography.

Precision Measurements and Fundamental Tests

2700-PO-96

Andrew Ong¹, Julian Berengut¹, Vladimir Dzuba¹, Victor Flambaum¹

1. School of Physics, University of New South Wales, Australia

Optical Clocks Using Highly Charged Ions to Probe Variation of the Fine-Structure Constant

Optical transitions in highly-charged ions may provide the reference for atomic clocks with sensitivity to variation of the fine-structure constant enhanced by up to two orders of magnitude.

2700-PO-96B

Kan Wu¹, **Chunmei Ouyang**¹, Perry Ping Shum¹, Jia Haur Wong¹

1. Electrical & Electronic Engineering, Nanyang Technological University, Singapore

Characterization of the RIN-to-Phase-Noise Conversion Induced by Photodetectors in the Microwave Synthesis from Mode-locked Lasers

The relative-intensity-noise-to-phase-noise conversion induced by the photodetectors in the microwave synthesis from mode-locked lasers is investigated. A new and simple method is proposed to evaluate the noise conversion avoiding measuring the exact noise spectra.

ACOFT Presentation

Fundamentals of Nonlinear Optics

2700-PO-97

Andrew Golubkov¹, Vladimir Makarov¹

1. M.V. Lomonosov Moscow State University, Advanced Education and Science Center, Russia

Nonlinear Spectroscopy of One-Dimensionally Inhomogeneous Medium with Cubic Nonlinearity

The possibility of unique reconstruction of the spatial profile of the cubic nonlinear susceptibility tensor component of a one-dimensionally inhomogeneous plate whose medium has a symmetry plane perpendicular to its surface is proved and reconstruction algorithm is proposed.

2700-PO-98

YeongKwon Cho¹, Kihong Kim¹

1. Division of Energy Systems Research, Ajou University, Korea

The Spectral Analysis of Breathing and Chaotic Solitons in the Dissipative Nonlinear systems

By the cubic-quintic complex Ginzburg-Landau equation, the existence of breathing and chaotic solitons and their spectral properties are revealed in detail. The spectral analysis helps the understanding of different behaviors of solitons.

ACOFT Presentation

2700-PO-99

Elena Turitsyna¹, Gregory Falkovich², Atalla El-Taher¹, Paul Harper¹, Xuewen Shu¹, Sergei Turitsyn¹

1. Photonics Research Group, Aston University, UK
2. Physics of Complex System, Weizmann Institute of Science, Israel

Optical Turbulence and Spectral Condensate in Fibre Lasers

We study optical wave turbulence in Raman fibre lasers with cavities larger than 10-km scale. We demonstrate that the sign of the cavity dispersion has critical impact on properties of the generated radiation.

Joint IQEC/GLEO Pacific Rim

Nanophotonics

2700-PO-100

Indika B. Udagedara¹, Ivan D. Rukhlenko¹, Malin Premaratne¹

1. Department of Electrical and Computer Systems Engineering, Monash University, Australia

Propagation of surface plasmon-polaritons in linear chains of metallic nanoparticles embedded in a gain medium

The two different types of complex solutions to the dispersion equation of surface plasmon-polaritons residing in a linear chain of metallic nanoparticles are analyzed in the presence of gain in the host medium.

2700-PO-101

Michael Lorke¹, Torben Nielsen¹, Jesper Mørk¹

1. DTU Fotonik, Department of Photonics Engineering, Denmark

Dynamical Properties of QD-based Nanolaser Devices

We investigate the switch-on behavior of QD-based nanolasers devices. Even though carrier capture needs to take place before emission can occur, we observe a fast switch-on that is driven by an ultra-fast carrier dynamics.

2700-PO-102

Madara Marasinghe¹, Malin Premaratne¹, David Paganin²

1. Faculty of Engineering, Monash University, Australia
2. School of Physics, Faculty of Science, Monash University, Australia

Degree of Polarization of Mie Scattered Stationary Partially Coherent Electromagnetic Fields

The polarization of non-paraxial partially coherent light scattered from nanospheres cannot be described easily. We utilize the degree of polarization to quantify Mie scattered partially coherent light and demonstrate that this form regular polarization lattices.

2700-PO-103

Khaled Kirah¹

1. Faculty of Engineering, The French University in Egypt (UFE), Egypt

The Study of a New Spatial Arrangement for Carbon Nanotube Photovoltaic Array

An array spatial arrangement of carbon nanotube based diodes is formed as a square mesh fractal topology in order to concentrate the incident power in hot spots. A simulator based on the self-consistent solution of Poisson and the drift-diffusion equations is used to calculate the I-V characteristics of the device and hence its efficiency.

2700-PO-104

Jae Yong Lee¹, Eun Seong Lee¹

1. Korea Research Institute of Standards and Science, Korea

Simple Analytic Modeling of Photoresist Development Profiles in Evanescent-field Optical Lithography

We present a simple analytic model to predict photoresist profiles with a localized exposure decaying exponentially in a photoresist of finite contrast. Impacts of lithographic parameters such as exposure dose and developing time are explored.

2700-PO-105

S. Hidaka¹, H. Hattori¹, Y. Yamamoto^{2,3}, S. Tokonami¹, H. Yamauchi⁴, S. Ito^{4,5}, T. Iida^{1,5}

1. Nanoscience and Nanotechnology Research Center, Japan

2. GreenChem In, Japan

3. Department of Applied Chemistry, Japan

4. Graduate School of Engineering Science, Osaka University, Japan

5. PRESTO, Japan Science and Technology Agency, Japan

Theoretical Study of Light-induced Force on Spherical Shell-type Metallic Nanocomposites

A high power picosecond laser was demonstrated in an all fiber MOPA configuration. The maximum power was 12W and the UV output at 355nm was 2.9W with 44MHz repetition rate and 5.6ps duration. We theoretically study the optical response and light induced force (LIF) on metallic nanoparticles arranged on the surface of microsphere. Results show that significantly broad optical spectra and sufficiently strong LIF can be obtained.

2700-PO-106

Qiming Zhang¹, Xiangping Li¹, Min Gu¹

1. Centre for Micro-Photonics, Faculty of Engineering and Industrial Sciences, Australia

Characterisation and Optimisation of Photonic Crystal Superlens for Super-resolution Nanoscopy

The spectral responses of a superlens with triangular-lattice and square-lattice photonic crystal structures were studied by simulation using the finite element method. The simulation predicts the smallest focusing spot size of $\lambda/3.9$ in the near field of the square-lattice photonic crystal superlens. The application of such a superlens in super-resolution imaging will be demonstrated by a near-field scanning microscope.

2700-PO-107

Wei Liu¹, Dragomir N. Neshev¹, Ilya V. Shadrivov¹, Andrey E. Miroshnichenko¹, Yuri S. Kivshar¹

1. Nonlinear Physics Centre, Centre for Ultra-high bandwidth Devices for Optical Systems (CUDOS), Australia

Manipulation of Airy plasmon beams by linear optical potentials

We demonstrate that in linear optical potentials obtained in wedged metal-dielectric-metal structures, the deflection of plasmonic Airy beams could be accelerated, compensated or reversed, thus creating new opportunities for on-chip signal processings and nanoparticle clearances.

2700-PO-108

Fumiaki Tajima¹, Yoshio Nishiyama¹

1. Yokohama National University, Japan

Measurement and Analysis of Scattering of an Evanescent Wave by a Thin Fiber on or Near a Prism

Measured optical scattering patterns of an evanescent wave by a nano-fiber on or near a prism are well fitted by a model taking into account near-field effects and multiple reflections.

2700-PO-109

Ivan Fernandez-Corbaton¹, Nora Tischler², Gabriel Molina-Terriza¹

1. QISS, Department of Physics and Astronomy, Macquarie University, Australia

2. Applied Optics and Nanotechnology Group, Queensland University of Technology, Australia

Radiation Diagrams from a Nanohole in the Momentum Basis

We present the complete radiation diagram of the field scattered by a nanohole in a metallic film under Gaussian illumination. The expansion coefficients for both propagating and evanescent planewave components are obtained in a semi-analytical fashion.

2700-PO-110

K. Alan Shore¹

1. Bangor University, School of Electronic Engineering, UK

Electrically-Injected Nano-Spin VCSELs: Design and Applications

Procedures for optimized design of the dynamical and wave-guiding properties of electrically-injected metal-clad nano-spin VCSELs are presented. Such procedures enable laser bandwidth maximization and threshold current minimization. Options for utilizing optimized devices are indicated.

2700-PO-111

Nora Tischler¹, Kristy Vernon¹

1. Applied Optics Group, Discipline of Physics, Queensland University of Technology, Australia

Coupling of Quantum Dots to Plasmonic V Groove Waveguides

We study the coupling of emitters such as quantum dots to plasmonic waveguides consisting of a triangular groove in metal. The decay rate of the emitter into the plasmonic mode and coupling efficiency are determined.

2700-PO-112

John Canning^{1,2}, Angelica Lau^{1,2}, Masood Naqshbandi^{1,2}, Ingemar Petermann^{1,2}, Maxwell J. Crossley^{1,2}

1. Interdisciplinary Photonic Laboratories (iPL), School of Chemistry, The University of Sydney, Australia

2. School of Chemistry, The University of Sydney, Australia

Giant Self-Assembled Mesostructured Silica Sphere Characterised using a Doped Fluorophore and an AMOLED Mobile Screen as the Excitation Source.

Using the emission for the blue OLED component of a HTC Android Phone, a Rhodamine 123 doped silica mesostructured shell, fabricated by evaporative self-assembly on a super hydrophobic surface, is excited with blue light and the fluorescence image taken. The results demonstrate the potential of smart mobile platforms as optical hardware for portable and intelligent diagnostics as well as illustrating the fabrication of large mesostructured spheres.

Ultrafast Optics and Photonics

2700-PO-113

Yu Oishi¹, Masudul Kabir¹, Daiki Ito¹, Fumihiko Kannari¹

1. Department of Electronics and Electrical Engineering, Keio University, Japan

Two-wave mixing amplification of femtosecond pulses in a Rh:BaTiO₃ crystal

We report the photorefractive two-wave mixing amplification of broadband femtosecond pulses in a Rh:BaTiO₃ crystal. The maximum gain coefficient of the two-wave mixing amplification was $\sim 11/\text{cm}$ using 30 fs pulses at 800 nm wavelength regime.

2700-PO-114

Hoe-Seok Jeong¹, Chan-Young Kim¹, Woojin Shin², **Tae-Jung Ahn¹**

1. Dept. Photonic Engineering, Chosun University, Republic of Korea

2. Photonics Research Institute (APRI), Republic of Korea

First-order optical differentiator based on fused fiber coupler

We have proposed a novel first-order optical differentiator based on a conventional fused-fiber coupler. The optical differentiator can be fabricated using simple processes and provides ultrafast signal processing.

Ultrafast Laser Science

2700-PO-115

Yasuo Nabekawa¹, Yusuke Furukawa¹, A. Amani Eilanlou^{1,2}, Kennichi. L. Ishikawa², Eiji. J. Takahashi¹, Katsumi Midorikawa¹

1. *Advanced Science Institute, RIKEN, Japan*
2. *The University of Tokyo, Japan*

Development of an Intense High-order Harmonic Beam Line using a Sub-15fs Multi-terawatt Leaser System at 100-Hz Repetition Rate

We report on the development of a multi-TW laser system with a pulse duration of 12 fs and an a repetition rate of 100 Hz. This laser system is applied to generate intense high-order harmonic fields with loosely focused geometry.

2700-PO-116

Yosuke Kojima^{1,2}, Yusuke Furukawa¹, Yasuo Nabekawa¹, Eiji Takahashi¹, Fumihiko Kannari², Katsumi Midorikawa¹

1. *RIKEN, Japan*
2. *Keio University, Japan*

Beam Splitter Materials for XUV High-order Harmonic Fields without Absorbing Visible Light

We have investigated the reflectance of several substrate materials against the XUV high-order harmonics of a Ti:sapphire laser. We expect these substrates to be suitable for high-average-power application due to the transparency for visible light.

2700-PO-117

Hongjun Liu¹, Shiguo Liang¹, Nan Huang¹, Qibing Sun¹, Wei Zhao¹

1. *Xian Institute of Optics and Precision Mechanics, Chinese Academy of Science, China*

Temporal Contrast Enhancement of Ultra-short Pulses by the Phase-conjugate Wave in a Kerr Medium

A novel method to improve the temporal contrast ratio of ultra-short pulses based on phase-conjugate wave generation is presented, which is promising as powerful technique to eliminate the background of ultra-short and ultra-intense laser pulses.

Tuesday 30 August 2011

1730-1930

POSTER SESSION 2 (3700)

Room: Bayside Terrace Level 2

CLEO Pacific Rim

Semiconductor and Electro-Optic Devices

3700-PO-1

Jin-Tae Kim¹, Suk-Hee Lee¹, Du-Ho Jo¹, IL-Won Kim², Hee-Dae Kim², Hyun-Ee Shin², In-Kag Hwang¹

1. *Department of Physics, Chonnam National University, Korea*
2. *Opticis Co., Korea*

Simulation and Implementation of 780 nm Single-mode Micro-structured VCSEL

We report full-3D FDTD simulation and experimental implementation of 780 nm micro-structured VCSELs, and show strong correlation between the simulation and experimental data. Output power of 1.7 mW with SMSR of 24 dB was achieved.

3700-PO-2

Ying-Chien Chu¹, Yan-Kuin Su¹, Chia-Hsin Chao², Wen-Yung Yeh²

1. *National Cheng Kung University, Taiwan*
2. *Industrial Technology Research Institute, Taiwan*

Studies on the Color Converting Efficiency of Organic Polymer Integrated onto InGaN Light-emitting Diodes

PMMA prevents organic light-emitting polymer chain from conjugating while deposited onto blue LED. Encapsulating LED by epoxy enhances the maximum conversion efficiency and red-shift of wavelength would be eased since modification of heat and moisture.

3700-PO-3

Seungtaek Kim¹, Hyoyoeng Park¹, Kyeongyong Ch¹, Jongseok Kim¹, Kyeongkyun Lee¹, Hyngtae Kim¹

1. *Korea Institute of Industrial Technology, Korea*

Illuminance and color coordinate variation in CIE chromaticity due to the signal modulation for LED lighting

The effects of the illumination and the color coordinates was experimentally monitored using the fabricated LED lightings with about 7 W at two different heights. It was observed that the trace of the illuminance is similar to the line shape but the trajectory of the color coordinates was different for each condition.

3700-PO-4

Bradley A. Clare¹, Kerry A. Mudge¹, Kenneth J. Grant¹

1. *Defence Science and Technology Organisation, Australia*

Design of a Coupled Quantum Well Modulator with Enhanced Modulation Efficiency

A coupled quantum well modulator design is presented which offers a 30% improvement in modulation efficiency at 1500nm, compared to current state-of-the-art.

3700-PO-5

Po-Tsun Liu¹, Chur-Shyang Fuh¹, Yi-Teh Chou¹, Li-Feng Teng¹, Fu-Hai Li¹, Han-Ping Shieh¹

1. *National Chiao Tung University, Taiwan*

High performance amorphous IGZO TFT with in-situ IGZON back channel passivation

A thin film transistor (TFT) with bi-layer stack structure of amorphous nitrogenated InGaZnO (a-IGZO:N) on an InGaZnO (IGZO) channel is proposed to enhance device stability
ACOFT Presentation

3700-PO-6

Ming-Hsuan Kao¹, Ting-Gang Chen², Min-An Tsai³, Hsin-Chu Chen², Fang-I Lai¹, Hao-Chung Kuo², Shou-Yi Kuo⁴, Pei-Chen Yu²

1. *Yuan Ze University, Taiwan*
2. *National Chiao Tung University, Taiwan*

3. National Chiao Tung University, Taiwan

4. Chang Gung University, Taiwan

Fabrication and Simulation of Antireflective Nanostructures on c-Si Solar Cells

The enhanced photoelectric conversion is demonstrated in nanostructured photovoltaics using RIE techniques. The trapezoid-cone arrays Si with SiNx passivation layer suppress the reflection in the wavelength 400-1000 nm. An RCWA simulation describes the optimized nanostructure to further reduce reflectance.

ACOPT Presentation

3700-PO-7

Ming-Yang Hsieh¹, Shou-Yi Kuo^{1,2}, Fang-I Lai³, Ming-Hsuan Kao³, Pei-Hsuan Huang³, Hao-Chung Kuo⁴, Hsun Wen Wang⁴, Min-An Tsai⁴

1. Chang Gung University, Taiwan

2. Chang Gung University, Taiwan

3. Engineering, Yuan-Ze University, Taiwan

4. National Chiao Tung University, Taiwan

Optimization of CdS Buffer Layer on the Performance of Copper Indium Gallium Selenide Solar Cells

In this study, we report on the performances of Cu(In,Ga)Se₂ solar cells device simulation of the carrier concentration and thickness of CdS buffer layer, to find out an optimum CIGS solar cell.

3700-PO-8

M. Xin^{1,2}, C.E. Png², S.T. Lim², V. Dixit², A.J. Danner^{1,2}

1. National University of Singapore, Singapore

2. Institute of High Performance Computing, Agency for Science, Technology and Research, Singapore

A High Speed Electro-optic Phase Shifter Based on a Polymer-infiltrated P-S-N Diode Capacitor

A polymer-infiltrated P-S-N diode capacitor is studied for phase shifters that incorporate both Pockels nonlinearity and carrier depletion. At least 269 GHz 3-dB bandwidth with high efficiency of 5.5 V/cm and 5.83 pJ/bit is achievable.

ACOPT Presentation

3700-PO-9

H.H. Tsai¹, H.C. Chen¹, C.H. Wang¹, K.J. Chen¹, C.W. Hung¹, C.C. Yeh¹, C.C. Lin², H.C. Kuo¹, T.C. Lu^{1,2}

1. Department of Photonic & Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan

2. Institute of Photonic System, National Chiao Tung University, Taiwan

Improving the Lumen Efficiency by Air-gap Embedded Package in White Light-emitting Diodes

White light-emitting diodes with air-gap embedded package were proposed and fabricated through a simple method including pulsed spray coating. The lumen efficiency of air-gap embedded LED was enhanced by 8.8% compared to reference remote-phosphor LED.

ACOPT Presentation

High Power Laser Technology and High Energy Density Physics

3700-PO-10

Changhwan Lim¹, Sung-Ki Hong¹, Hee Jin Kim¹, In Ho Yun¹, Taek-Jin Yang², Hidetsugu Yoshida³, O-Hwan Kwon², Masahiro Fujita³, Masahiro Nakatsuka³

1. Korea Atomic Energy Research Institute, Korea

2. P-Cube Inc., Korea

3. Institute of Laser Engineering, Japan

Development of a Split-Disk Nd: Ceramic Amplifier for Materials Processing

Small signal gain of a split disk Nd: Ceramic amplifier was measured more than 3 at the center of gain medium. Output energy of the amplifier in five-pass geometry was 6.5 J at 10 nsec.

3700-PO-11

Yan Shao¹, Jin Zhou¹, Lin Lai¹

1. College of Aerospace and Material Engineering, NUDT, China

Numerical Simulation of a CW Supersonic DF-CO₂ Transfer Chemical Laser Based on HYLTE Nozzle

Aiming at the application of continuous wave supersonic DF-CO₂ transfer chemical laser based on HYLTE nozzle, chemical kinetic model and inlet parameter optimization are performed by three-dimensional nozzle-cavity flowfield simulation. This modeling procedure could be used as a method to guide experiments to improve DF-CO₂ TCL performance.

3700-PO-12

Paulo S. André¹, Fátima Domingues¹, Margarida Facão¹, Ana M. Rocha¹

1. Instituto de Telecomunicações and Physics Department, Aveiro University, Campus Santiago, Portugal

Optical Fuse Discharge Temperature Determination Employing the CIE Color Coordinates

We measured the fuse effect optical discharge temperature using CIE color coordinates. The achieved values for 2 and 3 W optical signal were 5196 K and 5348 K, respectively.

Solid-State Laser and Other Lasers, and Laser Materials

3700-PO-13

Masanori Kaku¹, Masahito Katto¹, Shoichi Kubodera¹

1. University of Miyazaki, Japan

Vacuum ultraviolet Ar₂⁺ laser at 126 nm pumped by an infrared high-intensity laser

We have observed similar small signal gain coefficients of 0.84 and 0.86 cm⁻¹ in two different experiments, where Ar₂⁺ was produced in free space filled with Ar and inside an Ar-filled hollow fiber, respectively.

3700-PO-14

Jacek Kwiatkowski¹, Jan Jabczynski¹, Waldemar Zendzian¹, Jacek Swiderski¹, Lukasz Gorajek¹, Mateusz Kaskow¹

1. Military University of Technology, Poland

Resonantly Pumped Q-switched Ho:YAG Laser

The Q-switched Ho:YAG hybrid laser resonantly pumped at the wavelength of 1908 nm was developed. For the best case of Q-switching regime the pulses of 127 kW peak power (2.8 mJ, 22 ns) were achieved at the repetition rate of 20 Hz.

3700-PO-15

Takuya Inoue¹, Masataka Hshimoto¹, Junichi Matuura¹, Atsushi Taketomi¹, Yuki Wada¹, Shigeru Yamaguchi¹, Yasuhiro Kamba¹, Jun Enokidani², Kazuyoku Tei¹, Shin Sumida²

1. Tokai University, Japan

2. Seikoh Giken Co. Ltd., Japan

High power hybrid pico-second laser

A high power picosecond laser was demonstrated in a hybrid MOPA configuration operating at 1064nm. The maximum power was 10W and the green output was 3W with 100MHz repetition rate and 30ps duration.

3700-PO-16

Che-Hsuan Su¹, Yu-Chueh Hung¹

1. Institute of Photonics Technologies, National Tsing Hua University, Taiwan

Amplified Spontaneous Emission from Photopumped Films of Dye-doped DNA Biopolymers

We report photoluminescence, amplified spontaneous emission, and optical gain of dye-doped DNA biopolymers based on different surfactant systems. Results show that lower threshold and higher gain can be achieved using different surfactant in DNA biopolymer.

3700-PO-17

Yutaka Kondo¹, Seiji Watanabe¹, Tatsuya Igarashi¹, Yoshinobu Sasatani¹, Kenta Sasaki¹, Sakae Kawato^{1,2,4}, Hiroyuki Hitotsuya¹, Shinichi Matsubara^{2,3}

1. Graduate School of Engineering, University of Fukui, Japan
2. Japan Synchrotron Radiation Research Institute, Japan
3. The Institute of Physical and Chemical Research, Japan
4. Research and Education Program for Life Science University of Fukui, Japan

Ultrashort-pulse nonlinear Raman Yb:YAG laser with Raman medium

By using a Raman medium in the mode-locked Yb:YAG laser oscillator to generate broad emission spectra and ultrashort-pulses. We will use Raman medium for a Raman pulse Yb:YAG laser.

3700-PO-18

Kenta Sasaki¹, Hiroshi Furuta¹, Susumu Yonezawa¹, Shinichi Matsubara^{2,3}, Seiji Watanabe¹, Yoshinobu Sasatani¹, Tatsuya Igarashi¹, Hiroyuki Hitotsuya¹, Yutaka Kondo¹, Sakae Kawato^{1,2,4}

1. Graduate School of Engineering, University of Fukui, Japan
2. Japan Synchrotron Radiation Research Institute, Japan
3. The Institute of Physical and Chemical Research, Japan
4. Research and Education Program for Life Science, University of Fukui, Japan

Spectroscopic and Lasing Properties of Highly-doped Ytterbium-glasses

In this study, we make highly-doped Ytterbium-ions glasses (YbF₃-BaF₂-AlF₃-GeO₂, YbBAG), and succeeded laser oscillations of 20 mol.% Ytterbium-ions glass. The highly-doped Ytterbium-ions glasses are much suitable for short-fiber or waveguide lasers.

3700-PO-19

Sungmo Ahn¹, Hanbit Kim¹, Heonsu Jeon¹, Yojin Kim²

1. Department of Physics and Astronomy, Seoul National University, Korea
2. Photonics Device Team, Korea Photonics Technology Institute, Korea

Band-edge lasers from 2D photonic crystal slabs patterned by self-assembled nanosphere lithography

We demonstrate photonic crystal band-edge laser from a 2D photonic crystal slab of triangular-lattice type, which is patterned by self-assembled colloidal nanosphere lithography. Under pulsed 980-nm optical pumping scheme, a clear laser emission around 1.5 μm was observed.

3700-PO-20

Dong Hoon Song¹, Yong Ho Cha³, Kyung Nam Kim³, Sung In Hwang¹, Young Uk Jeong³, **Do-Kyeong Ko^{1,2}**

1. Graduate Program of Photonics and Applied Physics, Gwangju Institute of Science and Technology, Korea
2. Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Korea
3. Lab. for Quantum Optics, Korea Atomic Energy Research Institute, Korea

Simple Herriott-type High Energy Femtosecond Laser with Two Notched Mirrors

A simple Herriott-type high energy femtosecond laser with only two notched mirrors without any compensator for q-parameter preserving is reported.

3700-PO-21

Martin Fibrich¹, Helena Jelínková¹, Karel Nejezchleb², Václav Škoda²

1. Czech Technical University in Prague, Czech Republic
2. Crytur Ltd., Czech Republic

Pr,Ce:YAlO₃ Laser Operation at Room Temperature

Spectroscopic properties and laser results of GaN-diode pumped Pr,Ce:YAlO₃ crystal at room temperature are reported. Output power of 30 mW at 747 nm wavelength has been demonstrated.

3700-PO-22

Jan Sulc¹, Michal Nemeč¹, Helena Jelinkova¹, Witold Ryba-Romanowski², Tadeusz Lukaszewicz³

1. Czech Technical University in Prague, Czech Republic
2. Polish Academy of Sciences, Poland
3. Institute of Electronic Materials Technology, Poland

Comparison of CW Diode Pumped Er:YVO₄ and Er:GdVO₄ Lasers

Two vanadate crystals, YVO₄ and GdVO₄, were compared as a laser hosts for erbium ion. Spectroscopic and laser characteristics were measured. Power up to 0.4 W was obtained at 1.6 μm under CW diode pumping at 977 nm.

3700-PO-23

Michal Nemeč¹, Helena Jelinkova¹, Jan Sulc¹, Karel Nejezchleb², Vaclav Skoda²

1. Czech Technical University in Prague, Czech Republic
2. Crytur, Ltd., Czech Republic

Passive Q-switching at 1645 nm of Er:YAG Laser with Co:MALO Saturable Absorber

Passively Q-switched 1645nm Er:YAG laser resonantly pumped by 1535nm Er:glass laser radiation was constructed. The system was Q-switched by saturable absorber Co²⁺:MgAl₂O₄ and the giant pulses with 58ns duration and 1.6mJ energy were generated.

Applied Nonlinear Optics

3700-PO-24

Eun Lee¹, Jae Lee¹

1. Korea Research Institute of Standards and Sc, Korea

Use of all-reflecting objective for interferometric coherent anti-Stokes Raman scattering microscopy

Reflecting objective is compared to refracting one in an interferometric coherent anti-Stokes Raman scattering microscopy. We find that non-dispersive characteristic of reflection makes the reflecting objective more suitable for interferometric imaging than the refracting one.

3700-PO-25

Yi-Ci Li¹, Huei-Ling Lin¹, Tai-Huei Wei¹

1. National Chung Cheng University, Taiwan

Optical Nonlinearities of Antimony Thin Film Studied with Picosecond Laser Pulses

Using the transmittive and reflective Z-scan technique with a 10 Hz, frequency-doubled, Q-switched and mode-locked Nd:YAG laser, the beam shrinkage with an Sb thin film is confirmed. We infer that plasma reflection is the mechanism.

3700-PO-26

P Hosking¹, M Simpson¹, C Rohde¹

1. The Photon Factory, University of Auckland, New Zealand

Enhanced Isotropic Etching of Quartz with Femtosecond Laser Pre-processing

A femtosecond machining apparatus has been constructed for creating micro- to nanoscale features in quartz and fused silica of up to 20 mm in length through sub-ablation threshold laser pulses followed by enhanced anisotropic etching.

Infrared and THz Technology, and Astrophotonics

3700-PO-27

Kazuki Horita¹, Tetsuya Kinoshita¹, Christopher T. Que¹, Elmer Estacio¹, Michael I. Bakunov^{2,3}, Kohji Yamamoto¹, Koji Suizu⁴, **Masahiko Tani¹**, Kodo Kawase⁴

1. Research Center for Development of Far-Infrared Region University of Fukui, Japan
2. University of Nizhny Novgorod, Russia
3. Institute of Applied Physics, Russian Academy of Sciences, Russia
4. Nagoya University, Japan

Efficient electro-optic sampling detection and generation of intense THz radiation via Cherenkov-type phase matching in a LiNbO₃ crystal coupled to a Si prism

Efficient terahertz generation and electro-optic detection via Cherenkov-type phase matching are demonstrated using a thin lithium niobate crystal coupled to a Si prism. Crystal thickness dependence and comparison with ZnTe electro-optic detection are discussed.

3700-PO-28

EuiSu Lee¹, KyuWon Han², Ji-Ho Yoon², Tae-In Jeon¹

1. Division of Electrical and Electronics Engineering/Korea Maritime University, Korea
2. Department of Energy and Resources Engineering, Korea Maritime University, Korea

Hydroquinone Clathrates by Temperature-dependent Terahertz Time-domain Spectroscopy

Using Terahertz Time-Domain Spectroscopy, we measured the structural transition from hydroquinone clathrates having the storage properties to crystalline α-form hydroquinone as a function of temperatures.

3700-PO-29

Muhan Choi¹, Choon-Gi Choi¹, Byungsoo Kang², Bumki Min²

1. Creative Research Center for Graphene Electronics, ETRI, Korea
2. Department of Mechanical Engineering, KAIST, Korea

Flexible Terahertz Metamaterial Using Babinet's Principle

In this paper, a multi-layered flexible THz metamaterial for narrow bandpass filter is demonstrated. The flexible THz metamaterial consists of a combination of three metallic layers filled with the polyimide substrate.

3700-PO-30

Satoshi Tsuzuki¹, Kazuyoshi Kurihara², Fumiyoshi Kuwashima³, Takashi Furuya¹, Kohji Yamamoto¹, **Masahiko Tani¹**

1. Research Center for Development of Far-Infrared Region, University of Fukui, Japan
2. Faculty of Education and Regional Studies, University of Fukui, Japan
3. Department of Electrical and Electronics Engineering, Fukui University of Technology, Japan

Superfocusing Effect of V-Groove Metallic Structure for Terahertz wave

Super-focusing of THz radiation in a V-groove metallic structure with an opening angle of 10 degree is investigated. For a 2-um bottom-width an amplitude transmission as large as 17% has been observed without coupling lens.

3700-PO-31

Geraldine Mariën^{1,4}, **Nick Cvetojevic^{1,4}**, Nemanja Jovanovic^{1,2,4}, Judith Dawes^{1,4}, Roger Haynes³, Jon Lawrence^{1,2}, Quentin Parker^{1,2}, Michael J. Withford^{1,4}

1. Department of Physics and Astronomy, Macquarie University, Australia
2. Australian Astronomical Observatory, Australia
3. innoFSPEC - Astrophysikalisches Institut Potsdam, Germany
4. Centre for Ultrahigh Bandwidth Devices for Optical Systems (CUDOS), Australia

The Uses of Fibre Bragg Gratings for Temporal Spectral Astronomy

Temporal spectral astronomy studies astrophysical phenomena showing spectral variability on very short timescales. The use of fibre Bragg gratings converts the spectral detection into a photometric one, allowing for short timescale variations to be resolved.

3700-PO-32

Yen-Chieh Huang¹, Tsong-Dong Wang¹, Ming-Yuen Chuang¹, Yen-Yin Lin¹, Fan-Yi Lin¹

1. Institute of Photonics Technologies, Department of Electrical Engineering, National Tsinghua University, Taiwan

Forward and Backward THz Difference Frequency Generation with Idler Loss Exceeding Parametric Gain

When the idler absorption loss exceeds parametric gain in THz DFG, the THz wave can still grow monotonically versus crystal length for forward DFG but saturates within a few absorption lengths for backward DFG.

Integrated and Guided-Wave Optics and Thin Film Optics

3700-PO-33

Steve Madden^{1,2}, Zhe Jin^{1,2}, Sukanta Debbarma^{1,2}, Douglas Bulla^{1,2}, Barry Luther-Davies^{1,2}

1. Centre for Ultrahigh Bandwidth Devices for Optical Systems, Australia
2. Laser Physics Centre, Australia

Low loss coupling to sub-micron thin film deposited rib and nanowire waveguides by vertical tapering

A vertical tapered waveguide of both rib and nanowire waveguides together with SU8 lateral tapered waveguide for mode size conversion to single mode fibre has been designed. Taper shape profile, offset tolerance have been investigated and get overlapping loss of less than 0.1 dB and 97% coupling efficiency.

3700-PO-34

Stevanus Darmawan¹, Landobasa Y.M. Tobing¹, Liliana Tjahjana¹, Yanbing Zhang¹, Dao Hua Zhang¹

1. Nanophotonics Lab, School of EEE, Singapore

Realization of coupled-resonator-induced transparency in silicon-on-insulator based ring-bus-ring geometry

We demonstrate coupled-resonator induced transparency by means of synergistic integration between the ring-bus-ring (RBR) configuration and the Mach-Zehnder interferometer (MZI) device, on silicon-on-insulator (SOI) material platform. Good agreement is obtained between experiment and the theory.
ACOFI Presentation

3700-PO-35

Kunlun Yan¹, Rongping Wang¹, Khu Vu¹, Robert Elliman², Kidane Belay², Barry Luther-Davies¹

1. CUDOS, Laser Physics Centre, ANU, Australia
2. Department of Electronic Materials Engineering, ANU, Australia

Photoluminescence in Er-doped Ge-As-Se Chalcogenide Thin Films

We report ion-implanted Er ions into Ge_{11.5}As₂₄Se_{64.5} thin films with different doses, and subsequently thermal-annealed the films with different times. The characterization results indicated that the thickness, refractive index and optical bandgap of the films can be stabilized with 3 hour thermal annealing. The 1.5 μm emission arising from the ⁴I_{3/2} - ⁴I_{5/2} transition was observed and a lifetime of 1.35 ms was obtained in films annealed at 180°C.

3700-PO-36

Yin-Jung Chang¹, Yu-Ting Chen¹

1. Department of Optics and Photonics, National Central University, Taiwan

Broadband Omnidirectional Antireflection Coatings for CIGS Solar Cells Optimized Using Simulated Annealing Algorithm Incorporated with Solar Spectrum

Antireflection (AR) coatings for CIGS solar cells optimized using simulated annealing algorithm incorporated with solar spectrum are presented. Material dispersions and reflections from backside metal are considered. The effect of solar spectrum is analyzed.

3700-PO-37

KyoungHo Kim¹, Q-Han Park¹

1. Department of Physics, Korea Univ., Korea

Effective Medium Theory with Finite Boundaries

We present a way to control the refractive index inside of an otherwise empty metallic waveguide by inserting dielectric slabs. Our work provides a simple rule to design metamaterial inside finite boundaries.

3700-PO-38

Yung-Hsiang Lin¹, Chung-Lun Wu¹, Yi-Hao Pai¹, Gong-Ru Lin¹

1. National Taiwan University, Taiwan

Spectral Shift and Mode Extinction Degradation on Off-axis Luminescence of Photoemissive SiNx/SiOx Bragg Mirror

A narrow-band self-photoemissive SiNx/SiOx Bragg mirror with a transmittance fringe based notch filtering function is characterized to show its mode-extinction degraded luminescence with a spectral shift of 15 nm at off-axis angle of only 15°.

3700-PO-39

Landobasa Tobing¹, Liliana Tjahjana¹, Dao Hua Zhang¹

1. Nanyang Technological University, Singapore

Experimental Quantification of Coupling-Induced effects in Ring-enhanced Mach-Zehnder Interferometers

This work reports the experimental quantifications of coupling-induced phase shift (CIPS) in various resonant structures fabricated in silicon-on-insulator technology, and confirms the counter-intuitive results that CIPS may change sign at increasing gap separation.

Information Optics, Optical Storage and Displays

3700-PO-40

Tao Fang¹, Hua Cheng¹, Yong Bi¹, Ying Zhang¹, Guang Zheng¹, Yanwei Wang¹, Yan Qi¹, Bin Wang¹, Boxia Yan¹

1. Academy of Opto-Electronics, Chinese Academy of Science, China

Compact Fiber Coupled Laser Diodes Module at 635nm for Laser Projection

A compact 635nm laser diode (LD) module has been developed with a staircase architecture and multi-LD packages for laser projection. This module allows it to couple the light into a single fiber with 600- μm diameter, numerical Aperture (NA) 0.22. Optical output power of 5.1W and optical to optical efficiency of more than 80% were demonstrated.

3700-PO-41

Ki-Mun Pak¹, Hyun-Hwan Choi¹, **Yong-Hyub Won¹**

1. Department of Electrical Engineering, Korea Advanced Institute of Science and Technology, Korea

Demonstration of a Fast Computer Generated Hologram Algorithm based on Amplitude-phase Modulation with Random Mask for an Optical ID System

A amplitude and phase modulation computer-generated hologram algorithm with random mask is presented for use in an ID tag applications system and the process of generation and reconstruction of the optical ID pattern is described.

ACOFT Presentation

3700-PO-42

Md Azim Ullah¹, Xiangping Li¹, Xueming Cheng², Jianshe Ma², Min Gu¹

1. Swinburne University of Technology, Australia
2. Tsinghua University, China

Two-photon Induced Three-dimensional Optical Data Storage Based on a Compact DVD Optical Head

The point spread function of a compact DVD optical head under femtosecond pulsed laser illumination has been characterised. For the first time, using the compact DVD optical head for two-photon induced three-dimensional (3D) optical data storage has been demonstrated.

3700-PO-43

Cheng Hua¹, Zheng Guang¹, Bing Wang¹, Tao Fang¹, Yan Qi¹, Yong Bi¹, Yangwei Wang¹, Boxia Yan¹

1. Academy of opto-electronics, Chinese academy of sciences, China

The Improvement of Color Uniformity for Laser Digital Cinema Projector

The concept of discreteness of RGB fibers is put forward, and its algorithm is proposed.
ACOFT Presentation

3700-PO-44

Priyamvada Venugopalan¹, Xiangping Li¹, Min Gu¹

1. Swinburne University of Technology, Australia

Characterisation of a Plasmonic Lens for Super-resolution Optical Data Storage

Far-field super-resolution focusing by a plasmonic lens structure will be experimentally characterised by a near field scanning microscope. Application of such a plasmonic lens for super-resolution optical data storage in photorefractive polymers will be demonstrated.

3700-PO-45

Le Thanh Bang¹, Nam Kim¹, Jae-Hyeung Park¹

1. School of Electrical & Computer Engineering, Chungbuk National University, Korea

Reconstruction of Three-dimensional Object by Point Array Projection using Active Lens Array

Recently, integral imaging is of great importance in three-dimensional capture and display due to its distinctive advantages over other competing technologies. Integral imaging displays a 3D image in real time without the use of special glasses on the part of the viewer. Integral imaging can also capture three-dimensional object as a form of an array of elemental images. However, the resolution of the captured three-dimensional information is limited due to generally insufficient resolution of individual elemental image. In this paper, we use an active lens array combined with an algorithm that can improve the resolution of the captured three-dimensional information. Using the captured three-dimensional information, three-dimensional mesh model of the captured object can be constructed. The proposed algorithm is based on analysis of two-dimensional images of object on which the point array is projected by the active lens array of varying focal length. From the shape of the projected points, the depth of each position on the three-dimensional object is determined. Our simulation and experimental results show that the

proposed method has higher resolution than previous depth sensing methods based on integral imaging.

3700-PO-46

James Chon¹, Adam Taylor¹, Timothy Chow¹

1. Centre for Micro-Photonics, Swinburne Univ. of Tech, Australia

Plasmonic Random Media Based on Gold Nanorods as an Optical Storage Medium

In this paper, we present our recent study on the plasmonic random media based on gold nanorods doped in polymer matrix using image correlation spectroscopy for noise-free multidimensional optical recording medium.

3700-PO-47

Yia-Chung Chang¹, Li-Chuan Tang¹

1. Research Centre for Applied Sciences, Academia Sinica, Taiwan

Ray-tracing Simulation of Pixel-matched Lenticular Lens (LLA) for Auto-stereoscopic Display and 3D Imaging

We present numerical simulation of the intensity profile of light refracted through an lenticular lens array (LLA) placed on top of a liquid crystal display (LCD). The "cross-talk" effect due to light refracted through neighboring lens is examined. The efficient method presented here allows one to adjust the design parameters of LLA to minimize the "cross-talk" effect.

Optical Communications and Networking

3700-PO-48

Lenin Mehedy^{1,2}, Masuduzzaman Bakaul^{1,2}, Ampalavanapillai Nirmalathas^{1,2}, Stan Skafidas^{1,2}

1. NICTA Victorian Research Laboratory, Australia
2. Dept. of Electrical and Electronic Engineering, The University of Melbourne, Australia

100 Gb/s 1024-way-split 100-km Long-reach PON Using Spectrally Efficient Frequency Interleaved Directly Detected Optical OFDM

A spectrally efficient (4 bit/s/Hz) 100 Gb/s long-reach PON is demonstrated based on 64-QAM and frequency interleaved directly detected optical OFDM that can potentially operate over 100 km of single mode fiber with a 1024-way-split.

3700-PO-49

Weifan Qiao¹, Kiyonobu Mozawai¹, Ken Kashiwagi¹, Yosuke Tanaka¹, Takashi Kurokawa¹

1. Tokyo University of Agriculture and Technology, Japan

Generation of Phase Only Pulses and Their Fiber Transmission Characteristics

We have generated phase only pulses by using an optical synthesizer and a delayed interferometer. The phase only pulses had much less nonlinear effect comparing to the usual intensity pulse.

3700-PO-50

Jong-In Song¹, **Hyoung-Jun Kim¹**

1. GIST, Korea

Characteristics of simultaneous photonic frequency upconversion utilizing FWM in a single SOA for WDM RoF applications

Characteristics of simultaneous photonic frequency upconversion utilizing four-wave mixing in a semiconductor optical amplifier were investigated. The power penalties for simultaneous frequency upconversion at the bit-error-rate of 10⁻⁹ were less than 1.1 dB.

3700-PO-51

Norhakimah Md Samsuri¹, Asmahanim Ahmad¹, Zulhedry Abdul Manaf¹, Dedy Tarsono¹, Drees Andriyanto¹, Kharina Khairi¹, Muhammad Najib Abdul¹, Romli Mohamad¹

1. TM Research & Development, Malaysia

Extended EPON System Analysis on the First Fiber-To-The-School (FTTSchool) Deployment in Malaysia

An extended distance for FTTSchool deployment using a single OLT for a distance of 29km with 256 optical splitting ratio from the OLT to the furthest school deployed is demonstrated. An average of 2ms round trip time and 92.383 Mbps throughput is observed.

ACOFT Presentation

3700-PO-52

Chung Ghiu Lee¹, **Joon-Ho Choi**¹, Eun-byeol Cho¹, Z. Ghassemloooy²

1. Dept of Electronic Engineering, Korea

2. University of Northumbria, UK

1 Mb/s Data Transmission Employing NRZ-OOK in a Visible Light Communication System

We report 1 Mb/s data transmission using NRZ-OOK signal format in a visible light communication system. The data signal is independently controlled and transmitted upon PWM dimming signal. The eye diagram of the received optical signal diagram has been measured and the technical issues are discussed.

3700-PO-53

P.K.A. Wai¹, C.Y. Li¹

1. The Hong Kong Polytechnic University, China

The advantages of using fixed transmitter/tunable receivers in slotted WDM ring networks

We demonstrated with Integer Linear Programming (ILP) methods that using fixed transmitter/tunable receiver (FTx/TRx) in slotted WDM ring networks can achieve better bandwidth utilization and provide better multicasting support.

Laser Metrology and Remote Sensing

3700-PO-54

Maitreyee Roy¹, Peter Manson¹, Erik Thorvaldson¹, Errol Atkinson¹, Mark Ballico¹

1. National Measurement Institute, Department of Innovation, Industry, Science and Research, Australia

Aperture Area Metrology Using Confocal Laser Beam Scanning Technique

In precision optical radiometric and photometric measurements, one of the limiting factors is an accurate knowledge of the area of a beam-limiting aperture. We present an aperture-area measurement system based on a confocal laser beam scanning technique.

3700-PO-55

Jedsada Wongsaroj^{1,2}, Monludee Ranusawud¹, Montian Tianprateep²

1. National Institute of Metrology, Thailand

2. Chulalongkorn University, Thailand

Determination of Length Difference Between Two Gauge Blocks Using a Michelson Interferometer

The length difference between two gauge blocks were measured by using a Michelson interferometer with a stabilized laser. Five pairs of gauge blocks, grade K were measured and a measurement uncertainty of 20 nm was achieved.

3700-OP-56

Hyunmin Park¹, Lim Lee¹, Kwang-Hoon Ko¹, Taek-Soo Kim¹, Do-Young Jeong¹

1. Quantum Optics Division, Korea Atomic Energy Research Institute, Yuseong, Daejeon, Korea

Detection of Coolant Leakage in Nuclear Reactor Using Off-Axis Integrated Cavity Output Spectroscopy

The sensor-type instrument for heavy water vapor detection was developed by using the off-axis integrated output spectroscopic technique. The minimum detectable change of HDO concentration with this device was evaluated as 1.6 ppm.

3700-PO-57

Hajime Takahashi¹, Hiroki Yagishita¹, Hirokazu Nozue¹, Kazuyoku Tei¹, Shigeru Yamaguchi¹

1. Department of Physics, School of Science, Tokai University, Japan

Measurement of CO₂ Temperature using DFG (Difference Frequency Generation) of 2.7 μ m band

This paper reports CO₂ gas temperature diagnostics based on laser absorption spectroscopy in mid-infrared 2.7 μ m band. The error between optically measured temperature and conventionally measured one was found to be less than 1%.

3700-PO-58

Shine-Chieh Lin¹, Shin-Yu Lu¹, Che-Chung Chou¹, Tyson Lin¹

1. Department of Photonics, Feng Chia University, Taiwan

Optical Heterodyne Phase Detection and Frequency Stabilization of an External Cavity Diode Laser by Using Single Acousto-optics Frequency Shifter

We demonstrated an optical heterodyne scheme, based on single acousto-optic frequency shifter, to detect laser phase variation. The signal was used in laser frequency stabilization, and the estimated stability was about 2.28 \times 10⁻⁹.

3700-PO-59

Kenji Wada¹, Shumpei Takeshita¹, Yuki Hono¹, Tetsuya Matsuyama¹, Hiromichi Horinaka¹

1. Department of Physics & Electronics, Graduate School of Engineering, Osaka Prefecture University, Japan

Simple Distance Measurement Using a Gain-Switched DFB Laser as Two in One Light Source and Photodetector

We demonstrate a simple distance measurement using a gain-switched DFB laser operating as both a picosecond pulse oscillator and a photodetector with picosecond time-gate. As a result, 5-m optical distance was measured with sub-millimeter resolution.

3700-PO-60

Alexandre Santos^{1,2,3}, Mohammad Mohammadi^{1,2}, Shahraam Afshar^{1,3}

1. School of Chemistry and Physics, the University of Adelaide, Australia

2. Department of Medical Physics, Royal Adelaide Hospital, Australia

3. Institute for Photonics & Advanced Sensing, School of Chemistry & Physics, University of Adelaide, Australia

Optimal Light Collection in BeO Fiber Optic Dosimetry

The use of BeO ceramic in fiber optic dosimetry is investigated and also new probe setups for optimizing the light collection, where results show that they are more efficient than previously investigated methods.

Laser Processing, Laser Microfabrication, and Industrial Applications

3700-PO-61

Hezhu Shao¹, Yuan Li², Li Zhao², Qi Wang³, Jun Zhuang¹

1. Department of Optical Science and Engineering, Fudan University, China

2. Department of Physics, Fudan University, China

3. School of Information Science and Engineering, China

Below-band-gap light absorption of supersaturated S-doped silicon by femtosecond-laser irradiation: first-principles study

We investigate theoretically the structural and optical properties of supersaturated S-doped silicon by femtosecond-laser irradiation, and propose the microscopic mechanism for the annealing induced decreasing of infrared absorption.

3700-PO-62

D. Nakamura¹, K. Okazaki¹, I.A. Palani¹, M. Higashihata¹, T. Okada¹

1. Department of Electrical Engineering, Graduate School of Information science and Electrical Engineering, Kyushu University, Fukuoka, Japan

Synthesis and Characterization of Well-Aligned ZnO:Sb Nanowires

Vertically-aligned ZnO nanowires on a sapphire substrate have been synthesized by a nanoparticle-assisted pulsed-laser deposition using a Sb₂O₃ doped ZnO target. Uniform cone- shape core was formed at the bottom of each vertically-aligned ZnO nanowire. The nanowires consist of single-crystalline wurzite ZnO crystal with a growth direction along [0001]. The room- temperature photoluminescence spectrum exhibited a strong ultraviolet emission at around 380 nm.

3700-PO-63

Dingke Zhang¹, Gorgi Kostovski¹, Annan Mitchell¹

1. RMIT University, Australia

Observation of Random Lasing Action in Dye Doped Polymer Incorporating Semi-ordered Biological Nanostructures from the Wings of Cicadas

We present a study of random lasing action from dye doped polymer with the scattering role of cicada wing nanostructures. Multimode peaks at 605nm with a mode linewidth of 0.55nm emission spectra were observed.

3700-PO-64

Benjamin P. Cumming¹, Min Gu¹

1. Centre for Micro-Photonics and CUDOS, Swinburne University of Technology, Australia

Direct Laser Writing with a Slit-beam Dynamically Controlled with a Phase Spatial Light Modulator

A spatial light modulator operating as a phase modulator is utilised to create a dynamic slit at the pupil plane of a microscope objective to fabricate circularly symmetric microstructures by direct laser writing.

Laser Chemistry, Biophotonics and Applications

3700-PO-65

Doris Grosse¹, Nektarios Koukourakis¹, Nils C. Gerhardt¹, Tobias Schlauch¹, Jan C. Balzer¹, Günther Tränkle², Andreas Klehr², Martin R. Hofmann¹, Götz Erbert²

1. Chair for Photonics and Terahertztechnology, Ruhr University Bochum, Germany
2. Ferdinand Braun Institute, Germany

Single-shot Holography with Colliding Pulse Mode-locked Lasers as Light Source

The concept of single-shot holography, a 3D imaging technique based on swept source optical coherence tomography, is demonstrated with colliding pulse mode-locked laser diodes as light sources.

3700-PO-66

Takeshi Namita¹, Masayuki Kawashima¹, Yuji Kato¹, Koichi Shimizu¹

1. Graduate School of Information Science and Technology, Hokkaido University, Japan

Reliable scattering coefficient estimation against absorption inhomogeneity by time-resolved measurement of backscattered light

The effect of absorption inhomogeneity on μ_s estimation of a scattering medium with a newly proposed technique was investigated. The estimation error was significantly reduced from that with a conventional technique.

ACOFI Presentation

3700-PO-68

Qiyuan Song¹, Fumihiko Kannari¹

1. Department of Electronics and Electrical Engineering, Keio University, Japan

Selective Two-photon Excitation with Simultaneous Spatial and Temporal Focusing

We add selective two-photon excitation (TPE) function for simultaneous spatial and temporal focusing using a femtosecond laser pulse shaper. Axial TPE resolution of 15 micrometer and linear axial scanning capability is achieved.

3700-PO-69

Bergoi Ibarlucea¹, Elisabet Fernández-Rosas², Jordi Vila-Planas¹, Stefanie Demming³, Carme Nogués², Jose A. Plaza¹, Carlos Domínguez¹, Stephanus Büttgenbach³, **Andreu Llobera^{1,3}**

1. Centre Nacional de Microelectrònica (IMB-CNM, CSIC), Spain
2. Universitat Autònoma de Barcelona, Spain
3. Institut für Mikrotechnik, Technische Universität Braunschweig, Germany

Poly(dimethylsiloxane) Photonic Lab on a Chip for Local Absorbance Measurement and Continuous Cell Counting

A photonic Lab on a Chip for real time cell analysis is presented with the possibility of measuring in three distinct regimes: absorption, scattering and scattering+absorption, with very low limit of detection (53 ± 1 cells).

3700-PO-70

Sairam Iyer¹, Frederique Vanholsbeeck¹, Luc Froehly²

1. Physics Department, The University of Auckland, New Zealand
2. Physics Department, The University of Auckland, New Zealand
3. Institut FEMTO-ST, Université de Franche-Comté, France

Using dual-fibre stretchers and coma as tools for independent 2nd and 3rd order tuneable dispersion compensation in a fibre-based 'scan-free' time domain optical coherence tomography system

Dispersion compensation is experimentally demonstrated by using a dual-fibre stretcher combined with the coma of an imaging lens in a fibre-based scan-free time domain optical coherence tomography system resulting in a resolution of 3 microns.

3700-PO-71

Joon Heon Kim¹, Sang-Youp Yim¹, Myoung-Kyu Oh¹, Hoonsoo Kang¹

1. APRI, GIST, Korea

Adsorption Kinetics at the Biomimetic Lipid Monolayer Studied by the Simultaneous Measurement of Optical Second Harmonic Generation and Surface Pressure

We studied adsorption kinetics of Malachite Green on the anionic lipid monolayer by the simultaneous measurement of time-dependent second harmonic generation and surface pressure. MG showed different adsorption characteristics depending on the initial surface pressure.

3700-PO-72

Jana Say^{1,2,3}, Carlo Bradac^{1,3}, Caryn van Vreden⁴, Cameron Hill², David Reilly⁵, Louise Brown², Nicholas King⁴, James Rabeau^{1,3}, Ben Herbert²

1. Centre for Quantum Science and Technology, Department of Physics, Macquarie Uni, Australia
2. Department of Chemistry and Biomolecular Science, Macquarie University, Australia
3. MQ Photonics Research Centre, Department of Physics, Macquarie University, Australia
4. Discipline of Pathology, School of Medicine, The University of Sydney, Australia
5. School of Physics, The University of Sydney, Australia

Fluorescent Nanodiamonds for Biological Applications

Nitrogen Vacancy centres in nanodiamonds make promising biological probes due to their optical stability. Here we address some of the challenges facing the widespread use of nanodiamonds including obtain small, separate optically active and functionalized nanodiamonds.

3700-PO-73

Seang Hor Eang¹, Youngkyu Park¹, Hee-Dok Choi¹, Seunghyun Yoon², Kyuman Cho^{1,2}

1. Department of Physics, Sogang University, Korea
2. Interdisciplinary Program of Integrated Biotechnology, Sogang University, Korea

Application of Heterodyne Double Pass Interferometer on the Readout Sensor for a Biochemical Fluidic Channel

The heterodyne interferometer using the double pass geometry of optical beams in the acousto-optic modulator (AOM) has been applied for measuring concentrations of ethylene glycol solution. Our preliminary studies show that 0.001% of ethylene glycol can be measured by using this new method.

3700-PO-74

Negar Mirjalili¹, Timo A. Nieminen¹

1. The University of Queensland, School of Mathematics and Physics, Brisbane, Australia

Research Applications of Theoretical and Computational Modelling of Optical Tweezers

A variety of methods can be and are used for modelling optical tweezers. We examine applications of such modelling in the research literature, and consider the applicability and appropriateness of different methods of modelling.

3700-PO-75

Norman Lippok^{1,2}, Poul Nielsen¹, **Frédérique Vanholsbeeck²**

1. Auckland Bioengineering Institute, Physics Department, The University of Auckland, New Zealand

Using the Continuum of Fractional Fourier Domains to Compensate Dispersion in Optical Coherence Tomography

The fractional Fourier transform was used to demonstrate its potential for dispersion compensation in OCT. Dispersion induced by a 26 mm water cell was compensated from 49 μ m. back to the theoretical axial resolution of 3.6 μ m.

3700-PO-76

George Brawley¹, Joachim Knittel¹, Warwick Bowen¹

1. School of Mathematics and Physics, University of Queensland, Australia

Improved Detection of Nanomechanical Motion Using a Coupled Microtoroid-Interferometer System

Using a microtoroid coupled to a fibre interferometer, we present experimental results demonstrating noise suppression in the measurement of kHz-range nanomechanical vibration of a microcantilever. Noise power was seen to be suppressed by up to 19dB.

Fiber Amplifiers, Lasers, Sensors and Devices

3700-PO-77

C.-L. Chang¹, **T.-D. Wang²**, C.-C. Chen²

1. Institute of Photonics and Optoelectronics, National Taiwan University, Taiwan

2. Department of Optics and Photonics, National Central University, Taiwan

Actively-Q-switched Yb-doped Photonics Crystal Fiber Laser for 10 Ns Pulse in Millijoule Level

A Q-switched Yb-doped PCF fiber laser generates a 1030-nm pulse with energy of ~1.2 mJ at 10 ns in near diffraction-limited beam quality. The system performance is characterized for the design of further power scaling.

ACOFT Presentation

3700-PO-78

Keiji Kuroda¹, Kohnosuke Sasahira¹, Yuzo Yoshikuni¹

1. Department of Physics, School of Science, Kitasato University, Japan

Pulse Generation System For Fiber Amplifier Optical Memory: Measurement Of Gain Saturation Properties

We report development of a pulse generation system for realization of optical memory based on optical interference inside a fiber amplifier. Properties of an erbium-doped fiber amplifier are evaluated and discussed as a memory medium.

3700-PO-79

Lingjie Kong¹, Xiaosheng Xiao¹, **Changxi Yang¹**

1. State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instruments, Tsinghua University, China

Operating Regime Analysis of Mode-locking Fiber Laser with Difference Equation

We proposed a difference equation model for fiber lasers mode-locked with nonlinear polarization evolution. It can be used to characterize intra-cavity nonlinear dynamics, such as steady one-pulse, period multiplication, multi-pulsing and chaos. The influence of adjusting wave-plate is also studied. By shifting linear phase bias, overdriving of saturable absorber is solved, and pulses of higher energy could be achieved. The modulation depth is found to affect the transition of intra-cavity dynamics.

3700-PO-81

Yuki Wada¹, Atsushi Taketomi¹, Takuya Inoue¹, Masataka Hashimoto¹, Yasuhiro Kamba¹, Shigeru Yamaguchi¹, Junichi Matsuura¹, Jun Enokidani², Kazuyoku Tei¹, Shin Sumida²

1. Tokai University, Japan

2. Seikoh Giken Co.,Ltd, Japan

A Study on Stabilization of Phase-Drift in a High-Extinction Guided-Wave Intensity Modulator

As a result of the optical pulse generation during the bias control of the modulator, the DERs of 38 dB and 35 dB were achieved for the duty cycles of 0.0056% and 1%, respectively.

3700-PO-82

Chen Chien-Hsing¹, Hsu Chih-Yu², Wang Jian-Neng³, Chau Lai-Kwan¹, Wu Wei-Te², Tang Jaw-Luen¹

1. National Chung Cheng University, Taiwan

2. National Pingtung University of Science and Technology, Taiwan

3. National Yunlin University of Science and Technology, Taiwan

A Novel Dual-Channel Fiber-Optic Particle Plasmon Resonance Sensor Realized by CO₂ Laser Engraving

We present a novel dual-channel fiber-optic particle plasmon resonance (FO-PPR) sensor for refractive index sensing. The sensor, fabricated by a CO₂ laser system, was realized by modification of gold sphere nanoparticles and gold nano-rods simultaneously in two different fiber sensing zones with a length of 2cm. This type of sensor has shown the capacity of simultaneously sensing two different channels of PPR signals with a relatively high refractive index sensitivity (~6.0/RIU).

3700-PO-83

Sun A Kim¹, Min-Hwan Lee¹, Eun-Sun Kim¹, In-Kag Hwang¹, Kyung-Hwan Oh²

1. Department of Physics, Chonnam National University, Korea

2. Photonic Device Physics Laboratory, Yonsei University, Korea

Theoretical and Experimental Characterization of Hollow Optical Fibers for Opto-fluidic Applications

We report optical properties of a hollow optical fiber depending on hole size and refractive index. This study will provide an important guideline for opto-fluidic devices based on hollow optical fibers.

3700-PO-84

Bo Zhou¹, Baojie Chen¹, Edwin Pun¹

1. City University of Hong Kong, China

Near-infrared Emission in Tm³⁺-Tb³⁺/Eu³⁺ Codoped Gallo-Germanate Glasses

Broadband 1.20 μ m emission ($G_4 \rightarrow {}^3H_4$ transition) in Tm³⁺-Tb³⁺/Eu³⁺ codoped gallo-germanate glasses was observed. The population inversion is realized by depleting the lower 3H₄ level, and the possible energy transfer processes involved are discussed.

3700-PO-85

Y.H. Cha¹, Y.G. Kim², **H.M. Park¹**, G.Lim¹, K.H. Ko¹, J.M. Han¹, T.S. Kim¹, D.Y. Jeong¹

1. Quantum Optics Division, Korea Atomic Energy Research Institute, Korea

2. Department of Physics, Kongju National University, Korea

3.3-mJ 13-ns Q-switched laser based on a 100- μ m-core rod-type ytterbium-doped photonic crystal fiber

We have developed a Q-switched laser based on a 100- μ m-core rod-type ytterbium-doped photonic crystal fiber. The maximal output energy is 3.3 mJ with a 13-ns pulse duration, and the maximal average power is 267 W.

3700-PO-86

Fotios Sidiroglou¹, Tinh Nguyen²

1. Centre for Telecommunications and Microelectronics, Victoria University, Australia

2. School of Engineering and Science, Victoria University, Australia

Synthesis of Chitosan Films on Optical Fibers for Detection of Ammonia Vapors

A chitosan-coated optical fiber sensor for the detection of ammonia chemical vapors is presented. Exposing the chitosan to ammonia gas causes a change in its refractive index that it is detected by the fiber end.

ACOFT Presentation

3700-PO-87

Harpreet K. Bal¹, Will Brown², Nicoleta M. Dragomir¹, Scott A. Wade², Fotios Sidiroglou¹, Greg W. Baxter¹, Stephen F. Collins¹

1. Optical Technology Research Laboratory, Centre for Telecommunications and Microelectronics, Victoria University, Australia

2. CAOUS, Swinburne University of Technology, Australia

Comparison of Spectra and Images of Bragg Gratings Written in three Different Optical Fibres

Optical fibre Bragg gratings were fabricated in 3 different fibres, and their spectra at 3 harmonics were measured and cross-compared with images of their internal complex refractive index profiles obtained via differential interface contrast imaging.

ACOFT Presentation

3700-PO-88

Alexei Tikhomirov¹, Scott Foster¹

1. MOD, DSTO, Australia

Towards a Splice-free Fibre Laser Array

We present a novel splice-free laser array architecture that uses a double-core fibre. Fibre tapers are used to couple the active and passive core. Results on coupling between cores is presented for two different fibres.

ACOFT Presentation

3700-PO-89

George Huyang^{1,2}, Ingamar Petermann^{1,2}, John Canning^{1,2}, Maxwell J Crossley²

1. Interdisciplinary Photonic Laboratories (iPL), the University of Sydney, Australia

2. School of Chemistry, the University of Sydney, Australia

Cold Preparation of Titania Sol-gel for Optical Fibre Applications

Titanium dioxide isopropyl sol-gels layers have been constructed for use within optical fibres in a simplified method based on cold drying as compared to common methods of sol-gel preparation that rely on heat treatment. The surface uniformity of these titania sol-gels are analyzed by spectroscopy in order to assess their properties and suitability for functionalised substrates such as porphyrin.

ACOFT Presentation

IQEC

Quantum Optics

3700-PO-90

Helen Chrzanowski¹, Julien Bernu¹, Ben Sparkes¹, Boris Hage¹, Austin Lund^{1,2}, Thomas Symul¹, Timothy Ralph^{1,3}, Ping Koy Lam¹

1. Centre for Quantum Computation and Communication Technology, Department of Quantum Science, Australia

2. Centre for Quantum Dynamics, Griffith University, Australia

3. Department of Physics, University of Queensland, Australia

Photon Number Discrimination Without a Photon Counter and Reconstructing non-Gaussian States of Light

We demonstrate a new approach to photon number discrimination, relying only on continuous variable homodyne measurements. We apply this technique to the reconstruction of the non-Gaussian one, two and three photon subtracted squeezed vacuum states.

3700-PO-91

S.J. Whalen¹, M.J. Collett¹, A.S. Parkins¹, H.J. Carmichael¹

1. Department of Physics, University of Auckland, New Zealand

Open Quantum Systems with Delayed Feedback

We consider two models for the decay of a harmonic oscillator, which couples to the reservoir at two spatial locations (i.e., exhibits a delay): one with the standard quantum-optical rotating-wave and resonance approximations, and one without.

3700-PO-92

Morgan Tacey¹, J.F. Corney¹

1. School of Mathematics and Physics, The University of Queensland, Australia, China

Use of Longer Soliton Pulses to Reduce Raman Noise in Fibre Squeezing

Noise sources such as Raman and GAWBS set the lower limit for squeezing in optical fibres. We found that longer soliton pulses improve squeezing, so long as residual phase noise from GAWBS is well controlled.

3700-PO-93

Wakana Ueno¹, Fumihiro Kaneda¹, Hirofumi Suzuki¹, Shigehiro Nagano¹, Atsushi Syouji¹, Keiichi Edamatsu¹, Ryosuke Shimizu², Koji Suizu³

1. Research Institute of Electrical Communication, Tohoku University, Japan

2. Center for Frontier Science and Engineering, University of Electro-Communication, Japan

3. Department of Electrical Engineering, Nagoya University, Japan

Generation of Polarization-entangled Photon Pairs using Two-period Quasi-phase Matched LiNbO₃

We demonstrate the generation of polarization-entangled photon pairs at telecommunication wavelengths with type-II quasi-phase matched spontaneous

parametric down-conversion (QPM-SPDC) having two poling periods. The generated two-photon polarization state was analyzed by the quantum state tomography.

3700-PO-94

T.J. Karle¹, A. Stacey¹, B.C. Gibson¹, K. Ganesan¹, S. Tomljenovic-Hanic¹, A.D. Greentree¹, C. Santori², R. Beausoleil², S. Praver¹

1. School of Physics, University of Melbourne, Australia

2. Hewlett Packard Laboratories, USA

Effects of process plasma on nitrogen-vacancy density in ultra-high purity diamond

We report on optical measurements which assess the impact of processing plasmas on the density of Nitrogen-Vacancy centres in ultra-high purity diamond. In particular we look at the depletion of NV before and after exposure to a hydrogen plasma using confocal microscopy.

3700-PO-95

Devon Biggerstaff^{1,2,3}, James Owens^{1,2,3}, Matthew Broome^{1,2,3}, Alessandro Fedrizzi^{1,2,3}, Michael Goggin^{1,2,3,4}, Graham Marshall^{6,7,8,5}, Trond Linjordet^{1,5}, Jason Twamley^{1,4}, Martin Ams^{5,7,8,5}, Michael Withford^{6,7,8,5}

1. ARC Centre for Engineered Quantum Systems, Australia

2. ARC Centre for Quantum Computer and Communication Technology, Australia

3. School of Mathematics and Physics, University of Queensland, Australia

4. Department of Physics, Truman State University, USA

5. Department of Physics and Astronomy, Macquarie University, Australia

6. ARC Centre for Ultrahigh Bandwidth Devices for Optical Systems, Australia

7. Centre for Quantum Science and Technology, Australia

8. MQ Photonics Research Centre, Australia

Continuous- and Discrete-time Quantum Walks with Non-classical Two-Photon Inputs

We present two-photon continuous- and discrete-time quantum walks, respectively implemented in an integrated coupled waveguide array and a polarization-based beam-displacer network. We observe distinctly non-classical signatures, constituting progress towards quantum simulation capabilities.

Quantum Science in Atoms, Molecules and Solids

3700-PO-96

Nadezhda P. Stadnaya¹, Hang T.T. Nguyen¹, Peter A. Meleshenko¹, Alexander F. Klinskikh¹

1. Voronezh State University, Russia

Can the Aharonov-Bohm effect be observed using spectroscopic methods?

We have shown that the presence of the Aharonov-Bohm flux affects the radiation spectrum of the electron in a 2D Coulomb potential. Question about observation of the Aharonov-Bohm effect using spectroscopic methods is also discussed.

Cold Atoms and Molecules

3700-PO-97

Zhenglu Duan¹

1. Jiangxi normal university, China

The Focusing and Collimation Effects of Cold Atomic Clouds Passing Through a Far Red-detuned Focused Gaussian Beam

This work has studied the focusing and collimation of atomic clouds when it passes through the atom-optical lens created by a far red-detuned Gaussian laser beam.

ACOFT Presentation

3700-PO-98

S.J. Rooney¹, P.B. Blakie¹, B.P. Anderson², A.S. Bradley¹

1. Jack Dodd Center for Quantum Technology, University of Otago, New Zealand

2. College of Optical Sciences, University of Arizona, USA

Suppression of Kelvin-induced Decay of Quantized Vortices in Trapped Bose-Einstein Condensates

We study the Kelvin mode excitations on a vortex line in a three-dimensional trapped Bose-Einstein condensate at finite temperature, finding activation of these modes strongly enhances vortex decay.

3700-PO-99

M. Egorov¹, V. Ivannikov¹, B. Opanchuk¹, B.V. Hall¹, P. Hannaford, A.I. Sidorov¹

1. Centre for Atom Optics and Ultrafast Spectroscopy, Swinburne University of Technology, Australia

Precision Measurements of s-wave Scattering Lengths in a Two-component Bose-Einstein Condensate

We developed a new method of measuring s-wave scattering lengths with a high precision ($a_{12} = 97.993(20) a_0$ and $a_{22} = 95.41(7) a_0$ in ^{87}Rb) using collective oscillations and Ramsey interferometry in a two-component Bose-Einstein condensate.

3700-PO-100

Mark Baker¹, Leif Humbert¹, Daniel Sigle¹, Erik van Ooijen¹, Simon Haine¹, Halina Rubinsztein-Dunlop¹, Matthew Davis¹, Norman Heckenberg¹

1. University of Queensland, School of Mathematics and Physics, Australia

Time-averaged Optical Dipole Traps for Bose-Einstein Condensates

We present here details of our all optical BEC apparatus, and our progress towards realisation of a ring trap using time averaged optical dipole potentials.

3700-PO-101

Marcus Lingham¹, Kristian Fenech¹, Sascha Hoinka¹, Paul Dyke¹, Eva Kuhnle¹, Hui Hu¹, Marion Delehay¹, Peter Hannaford¹, Alexei Orel¹, Chris Vale¹

1. Swinburne University of Technology, Australia

Crossover From 2D to 3D in a Weakly Interacting Fermi Gas

We present a characterisation of the crossover from two dimensions to three dimensions in a weakly interacting Fermi gas. We also report our progress towards creating an improved two-dimensional trap with a higher aspect ratio.

Quantum Information and Cryptography

3700-PO-102

Yuki Tagawa¹, Holger F. Hofmann^{1,2}

1. Hiroshima University, Japan

2. JST, CREST, Japan

Analysis of the Contextuality Paradox using Weak Measurement Statistics

We present a measurement strategy for the analysis of the state independent contextuality paradox in the quantum statistics of a pair of qubits using a sequence of state preparation, weak measurement and output post-selection.

3700-PO-103

D.J. Saunders¹, **M.S. Palsson¹**, G.J. Pryde¹, A.J. Scott¹, S.M. Barnett², H.M. Wiseman¹

1. Centre for Quantum Computation and Communication Technology, Centre for Quantum Dynamics, Griffith University, Australia

2. Department of Physics, University of Strathclyde, UK

Maximally Parsimonious Demonstrations of Quantum Nonlocality

Bell-nonlocality, EPR-steering, and entanglement are distinct phenomena that form a strict hierarchy of non-classicality. We show that the complexity of minimal tests for these phenomena formally exhibits the same hierarchy, and experimentally implement these tests with photons.

3700-PO-104

Rose Ahlefeldt¹, Wayne Hutchison², Matthew Sellars¹

1. The Australian National University, Australia

2. UNSW@ADFA, Australia

Characterisation of $\text{EuCl}_3.6\text{H}_2\text{O}$ for Multi-Qubit Quantum Processing

We describe a quantum computing architecture that uses satellite lines in rare earth doped $\text{EuCl}_3.6\text{H}_2\text{O}$ as qubits. We identify the crystallographic sites to which these lines belong and predict the performance of the quantum processor.

Precision Measurements and Fundamental Tests

3700-PO-105

Kan Wu¹, Chunmei Ouyang¹, Perry Ping Shum¹, **Jia Haur Wong¹**

1. Electrical & Electronic Engineering, Nanyang Technological University, Singapore

Phase Noise at Harmonic Frequencies of a Mode-locked Fiber Laser and Low-timing-jitter Microwave Extraction

The relation between the phase noise and the order of harmonic frequencies of a mode-locked fiber laser is experimentally investigated. The lowest timing jitter is 73 fs obtained at 11th harmonic frequency of 1619 MHz.

3700-PO-106

Ying Li¹, Kentaro Wakui¹, Tetsuya Ido¹, Shigeo Nagano¹, Kensuke Matsubara¹, Yuko Hanado¹, Kazuhiro Hayasaka¹

1. National Institute of Information and Communications Technology, Japan

New Strategy for an Indium Ion Optical Frequency Standard

We report on the progress toward 115ln+ optical frequency standard by new approaches. The report is focused especially on the clock laser locked to a novel rectangular-shaped cavity.

ACOFT Presentation

3700-PO-107

Michael Taylor¹, Alex Szorkovszky¹, Joachim Knittel¹, Kwan Lee¹, Warwick Bowen¹

1. University of Queensland, Australia

Regenerative Amplification in a Microtoroid by Electrical Actuation

We investigate mechanical regenerative amplification in a microtoroid by electrical actuation, and compare the linewidths achievable to that found with optical driving. We find an order of magnitude lower linewidth by this method.

Fundamentals of Nonlinear Optics

3700-PO-108

Chih-Rong Chen¹, Ming-Feng Shih¹, Hsiao-Chih Huang¹

1. Department of Physics, National Taiwan University, Taiwan

Propagation of Half-Charge Vortex Light Beams in a Self-Focusing Medium

We observe experimentally half-charge vortex light beams in a self-focusing medium. They break up into parts due to azimuthal instability, confirmed by our analysis. We find a way to stabilize them to form vector solitons.

3700-PO-109

Po-Chi Ou¹, **Ja-Hon Lin²**, Wen-Feng Hsieh^{1,3}

1. Department of Photonics & Institute of Electro-Optical Engineering, National Chia Tung University, Taiwan

2. Department of Electro-Optical Engineering & Institute of Electro-Optical Engineering, National Taipei University of Technology, Taiwan

3. Institute of Electro-Optical Science and Engineering, National Cheng Kung University, Taiwan

Optical nonlinear absorption of ZnO/ZnMgO multiple quantum wells at room temperature

Wavelength- and pumping-dependent optical nonlinear absorption was investigated in ZnO/ZnMgO multiple quantum wells by using the z-scan and pump-probe methods. The nonlinear response transits from saturable absorption into two-photon absorption as excitation below excitonic state.

ACOFT Presentation

Joint IQEC/CLEO Pacific Rim

Nanophotonics

3700-PO-110

Jun Oi¹, Shutaro Onishi¹, Keiichiro Matuishi¹, Takuya Harada¹, Fumihiko Kannari¹

1. Keio University, Japan

Measurement of Femtosecond Plasmon Response with Cross-correlation Dark-field Microscopy

We demonstrate an electric-field cross-correlation imaging technique to obtain a response function of localized plasmon generated by femtosecond laser pulses on gold nanostructures, which allows deterministic spatiotemporal plasmon control using femtosecond laser pulse shaping.

3700-PO-111

Jiong Shan¹, Wei Shi¹, Shen Xu¹, Liying Liu¹, **Lei Xu**¹

1. Key Lab for Micro and Nanophotonic Structures (Ministry of Education) Department of Optical Science and Engineering, School of Information Science and Engineering, Fudan University, China

Au-Nanoparticle Induced Large Enhancement of Optical Reorientation in Nematic Liquid Crystals

We found that when nematic liquid crystal (LC) cell surfaces were Au-nanoparticle modified, light intensity to induce LC reorientation can be 100 times less at Au surface plasmon resonance (SPR) wavelength.

3700-PO-112

Xavier Zambrana¹, Gabriel Molina-Terriza¹

1. Macquarie University, Australia

Control of Optical Resonances in Dielectric Spheres Using Laguerre-Gaussian Beams

In the conventional Mie scattering theory with dielectrics, resonances only appear in the optical range when the refractive index tends to infinity. A method to obtain optical resonances using Laguerre-Gaussian beams is presented.

ACOFT Presentation

3700-PO-113

Hironori Hattori¹, Shimpei Hidaka¹, Takuya Iida^{1,2}

1. Nanoscience and Nanotechnology Research Center, Osaka Prefecture University, Japan
2. PRESTO, Japan Science and Technology Agency, Japan

Theory of Configuration Control of Metallic Nanocomposites by Light Fields with Designed Polarization Distributions

We have theoretically demonstrated the dynamics control of metallic nanoparticles by light-induced force with axially-symmetric polarized laser beam. We clarify the possibility of fabrication of metallic nanocomposite with high rotational symmetry.

3700-PO-114

Eui Young Song¹, Sookyoung Roh¹, **Byoung Ho Lee**¹

1. National Creative Research Center for Active Plasmonics Application Systems, Korea

Plasmonic Nano-rods Structure Generating Rotational Fields for Polarization Sensing

We numerically analyze a plasmonic nano-rods structure generating rotational fields. The circularly symmetric nanostructure can induce rotational fields in opposite directions when illuminated with two orthogonally circularly polarized lights.

3700-PO-115

J.H. Woo¹, E.S. Kim¹, Boyoung Kang¹, E.Y. Choi¹, Hyun-Hee Lee¹, J.W. Wu¹, J. Kim¹, Tae Y. Hong², Y.U. Lee¹, Jae H. Kim²

1. Department of Physics & Quantum Metamaterials Research Center, Ewha Womans Univ, Korea

2. Department of Physics, Yonsei Uni, Korea

Cryogenic temperature measurement of THz meta-resonance in symmetric metamaterial superlattice

We investigated a change in the Q-factor of THz meta-resonance as a function of temperature in a symmetric metamaterial superlattice. Contributions of radiative damping and Drude damping are discussed in determining Q-factors of meta-resonances.

3700-PO-116

SeokJae Yoo¹, Q-Han Park¹

1. Department of Physics, Korea University, Korea

Improvement of Effective Medium Approximation for Dense Plasmonic Nanoparticle Monolayers

We present improved effective medium approximation (EMA) for plasmonic nanoparticle monolayers. Our EMA model shows optical properties of plasmonic nanoparticle monolayers: (1) anisotropy of monolayers, (2) perturbation of resonance frequency, and (3) long-wavelength transparency.

3700-PO-117

S. H. Eah¹, H.W. Kihm¹, Q.H. Kim¹, W.S. Bak¹, Dai-Sik Kim¹, S.M. Koo², N.K. Park²

1. Department of Physics and Astronomy, Seoul National University, Korea

2. Photonic Systems Laboratory, School of EECS, Seoul National University, Korea

Optical Activity of Subwavelength Single Hole

We investigated the magnetic light-matter interaction with subwavelength metallic single holes and find the optical properties of that are entirely determined by the interaction with the magnetic field of light as postulated by Bethe.

3700-PO-118

Shutaro Onishi¹, Jun Oi¹, Keiichiro Matsuishi¹, Takuya Harada¹, Fumihiko Kannari¹

1. Keio University, Japan

Measurement of Plasmon Response Function by Spectral Interferometry with NSOM for Spatiotemporal Plasmon Control

We measure spatiotemporal characteristics of femtosecond localized plasmon at gold nanostructures. Based on the plasmon response function deduced from these measurements, the femtosecond localized plasmon pulse is deterministically shaped using shaped femtosecond excitation laser pulses.

ACOFT Presentation

3700-PO-119

Chris Poulton¹, Adel Rahmani¹, Michael Steel²

1. School of Mathematical Sciences, University of Technology, Sydney (UTS), Australia

2. Department of Physics and Astronomy, Macquarie University, Australia

Radiation Dynamics in a Magneto-dielectric Metamaterial Cylinder

We study the radiation dynamics of an electric line current source in a homogeneous, magneto-dielectric cylinder. We find that radiation by the source is most enhanced by maximizing the magnetic response of the cylinder.

3700-PO-120

Kwang Jin Lee¹, **Kihong Kim**¹

1. Division of Energy Systems Research, Ajou University, Korea

Influence of Nonlinearity on the Optical Tamm Plasmons in One-dimensional Metal-less Structures

We show theoretically that the electromagnetic field enhancement and the influence of nonlinearity due to the excitation of Tamm plasmons are much stronger than those due to conventional surface plasmons.

3700-PO-121

Landobasa Tobing¹, **Liliana Tjahjana**¹, Dao Hua Zhang¹

1. Nanyang Technological University, Singapore

Low Voltage sub-30nm Dielectric and Metal Nanopatterning for Plasmonic and Metamaterial Applications

We present a simple approach for sub-30nm dielectric and metal patterning based on low voltage electron beam lithography and standard lift-off process by using 42nm hydrogen silsesquioxane and 200nm ZEP resist.

3700-PO-122

Ingemar Petermann¹, **John Canning**¹, Matthew Foley²

1. Interdisciplinary Photonics Laboratories (iPL), School of Chemistry, The University of Sydney, Australia

2. Australian Centre for Microscopy & Microanalysis, The University of Sydney, Australia

Fabrication of Gold-based Fractal Surfaces

Fractal aggregations of EDTA chelates formed during solvent evaporation are used as masks for gold plating. SEM analysis shows evidence of features down to less than 100 nm with complete metal coverage.

Ultrafast Optics and Photonics

3700-PO-123

W. Xu¹, **D. Y. Tang¹**, X.D. Xu², L.H. Zheng³, J. Zhang¹, W.D. Tan¹, D.Z. Li², B.L. Su³, J. Xu³, Qing Wang¹

1. School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

2. Key Laboratory of Materials for High Power Laser, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

3. Key Laboratory of Transparent and Opto-functional Inorganic Materials, Shanghai Institute of Ceramics, Chinese Academy of Sciences, China

Diode-pumped Passively Mode-locked Yb:LPS Laser

A diode-pumped passively mode-locked Yb:Lu₂Si₂O₇ (Yb:LPS) laser is firstly demonstrated. The shortest pulse duration is about 96fs. We found that the Yb:LPS crystal could have small normal group velocity dispersion near the mode locking wavelength of 1058nm and a large nonlinear optical Kerr coefficient.

3700-PO-124

Yongdong Zhang¹, Zhiyi Wei¹, Zhenlin Wang², Zhiguo Zhang¹, Haojia Zhang³, QiuHong Yang³

1. Joint Laboratory of Advanced Technology in Measurement, Institute of Physics, Chinese Academy of Sciences, China

2. School of Technical Physics, Xidian University, China

3. School of Materials Science and Engineering, Shanghai University, China

Efficient Diode-pumped Continuous-wave and Picosecond Lasers with Ceramic Yb:(Y_{0.9}La_{0.1})₂O₃ as Gain Medium

We generated 1.73 W CW laser from a diode pumped ceramic Yb:(Y_{0.9}La_{0.1})₂O₃ laser, corresponding to a slope efficiency of 60.2 % . Mode-locking the laser with SESAM results in 3.1 ps pulse duration at 1075nm.

Ultrafast Laser Science

3700-PO-125

Shinichi Yamashita¹, Takahumi Kozai¹, Kosuke Hirochi¹, Hayato Miyagawa¹, Noriaki Tsurumachi¹, Hiroshi Itoh¹, Shun Koshiba¹, Syunsuke Nakanishi¹

1. Department of Advanced Materials Science, Kagawa University, Japan

Femtosecond Coherent Vibrational Relaxation in PMMA Measured by Coherent Anti-Stokes Raman Spectroscopy

We have performed femtosecond coherent anti-Stokes Raman spectroscopy to study vibrational dynamics in polymethylmethacrylate. We measured the coherent vibrational relaxation rates of CH₂ symmetric and anti-symmetric modes and observed the signal beats between CH₂ modes.

3700-PO-126

Maruthi Manoj Brundavanam¹, Nirmal Kumar Viswanathan², Yoko Miyamoto³, Narayana Rao Desai²

1. Institute for Laser Science, The University of Electro-Communications, Japan

2. School of Physics, University of Hyderabad, India

3. Department of Engineering Science, The University of Electro-Communications, Japan

Spectral Correlation of Refocused Collinear Filaments Using Femtosecond Pulses

We present experimental results on the estimation of temporal separation between the refocused collinear filaments formed inside BK7 glass using spectral-correlation-induced modulations observed in the output spectrum due to focused femtosecond laser pulses.

3700-PO-127

Igor Litvinyuk¹, Irina Bocharova², Jean-Paul Brichta³, Emmanuel Penke⁴, Andre Bandrauk⁴, Francois Legare⁶, Joseph Sanderson⁵, Jean-Claude Kieffer⁶

1. Centre for Quantum Dynamics, Griffith University, Australia

2. Lawrence Berkeley National Laboratory, USA

3. University of Ottawa, Canada

4. University of Sherbrooke, Canada

5. University of Waterloo, Canada

6. INRS-EMT, Canada

Enhanced Ionization in Di- and Tri-atomic Molecules Observed with Coulomb Explosion Imaging

We used Coulomb explosion imaging (CEI) to observe enhanced ionization (EI) in nitrogen and carbon dioxide molecules. In N₂ we observed electron localization with time-resolved CEI using few-cycle laser pulses. In CO₂ we reconstructed molecular structure from triple coincidence measurements while varying pulse duration from 7 fs to 200 fs.

Wednesday 31 August 2011

1730-1930 POSTER SESSION 3 (4700)

Room: Bayside Terrace Level 2

Green Photonics

4700-PO-1

Yu-Kuang Liao¹, Shou-Yi Kuo², Fang-I Lai³, Tung-Po Hsieh⁴, Hao-Chung Kuo⁵

1. Department of Electrophysics, National Chiao Tung University, Taiwan
2. Department of Electronic Engineering, Chang Gung University, Taiwan
3. Department of Photonic Engineering, Yuan Ze University, Taiwan
4. Industrial Technology Research Institute, Taiwan
5. Department of Photonics, National Chiao Tung University, Taiwan

Photoluminescence and Time-resolved Photoluminescence of Cu(In,Ga)Se₂ Thin Film

We investigated Cu(In,Ga)Se₂ (CIGS) thin film with TR-PL to study its carrier dynamics. Different peaks in PL spectrum showed similar lifetime suggests different recombination mechanisms can equally affect the photocurrent in CIGS solar cells.

ACOFI Presentation

CLEO Pacific Rim

Semiconductor and Electro-Optic Devices

4700-PO-2

Mizuki Shirao¹, Nobuhiko Nishiyama¹, Shigehisa Arai^{1,2}

1. Department of Electrical and Electronic Engineering, Tokyo Institute of Technology, Japan
2. Quantum Nanoelectronics Research Center, Tokyo Institute of Technology, Japan

Numerical Analysis of Optical Gain of a 3-terminal HBT-SOA

A numerical simulation of a hetero-junction bipolar transistor (HBT) SOA was successfully demonstrated considering the effect of carrier pulling out. Short carrier recovery time of the HBT-SOA can provide large operation bandwidth and high gain.

4700-PO-3

Tupe Chen¹, Zhanhong Cen¹

1. Nanyang Technological University, Singapore

Electroluminescence from Si-implanted Silicon Nitride Thin Films

In this work, light emission excited electrically from Si-implanted silicon nitride thin films has been investigated.

4700-PO-4

Pei-Hsuan Huang¹, Hsun Wen Wang², Shou-Yi Kuo³, Min-An Tsai², Fang-I Lai¹, H. C. Kuo², Sien Chi¹

1. Department of Photonics Engineering, Yuan-Ze University, Taiwan
2. Department of Electrophysics, National Chiao Tung University, Taiwan
3. Department of Electronic Engineering, Chang Gung University, Taiwan

Optimum Design of Triple-junction Solar Cells with Sub-wavelength Surface

We design the solar cells by optimizing current matching between top and middle cells. For the optimized solar cell with surface texture structure, the enhancement of the Isc and the efficiency were 13.68 % and 12.24 %

4700-PO-5

Hsin-Chu Chen¹, Kuo-jo Chen¹, Cheng Wei Hung¹, Chao-Hsun Wang¹, Min-Hsiung Shih¹, Hao-Chung Kuo¹, Chien-Chung Lin¹

1. Department of Photonic & Institute of Electro-Optical Engineering, National Chia
2. Institute of Photonic System, National Chiao Tung University

Thermal Effect of GaN-based Light-emitting Diodes with CdSe/ZnS Quantum Dots

Thermal effect of GaN-based light-emitting diodes with CdSe/ZnS quantum dots is investigated. Phosphor conversion efficiency and junction temperature were studied to understand thermal properties under different injected currents and environmental temperatures.

4700-PO-6

Sook-Hui Lee¹, In-Kag Hwang¹, Hyun-Ee Shin², Hee-Dae Kim²

1. Department of Physics, Chonnam National University, Korea

Post-contraction of Oxide Aperture of VCSEL and Prediction of Its Effect on Reliability

We report post-contraction of oxide aperture and potential degradation of reliability of oxide-VCSEL which was exposed to KOH solution. We also suggest that ideality factor can be used to predict reliability of the damaged devices.

4700-PO-7

Yi Chen Huang¹, Y. S. Wang², W.J. Wang¹, N.C. Chen¹

1. Institute of Electro-Optical engineering, Department of Engineering, Chang Gung, Taiwan
2. Department of Electrophysics, National Chiao Tung University, Taiwan

AlGaInP LEDs Reliability Dependence on Different Mg Doping Concentration

In this study, we report the influence mechanism of different Mg doping concentration in LED P- type layer. We concluded from analyses of the I-V ~ C-V and Lop that this process is due to Mg out diffusion.

4700-PO-8

Yasar Kutuvantavida^{1,2}, Grant Williams³, Stefaan Janssens^{1,4}, Sebastia Pillai Raymond¹, Delower Bhuiyan¹, Andrew Kay¹

1. Industrial Research Limited, New Zealand
2. Institute of Fundamental Sciences, Massey University, New Zealand
3. MacDiarmid Institute, Industrial Research Limited, New Zealand
4. Victoria University of Wellington, New Zealand

Photostability Study of Structurally Modified Electro-Optic Chromophores and the Effect of Singlet Oxygen Quenchers

Structural modifications to enhance the temporal stability of the electro-optic chromophore, PYR-3, have not adversely affected the photostability. We find that the photostability can be enhanced by the addition of singlet oxygen quenchers.

4700-PO-9

Chia-Hsin Chao¹, Wen-Yung Yeh¹, Ming-Hsien Wu¹, Chao-Chyun An¹, Yu-Hung Chuang¹, Kuang-Yu Tai¹, Ying-Chien Chu¹, Mu-Tao Chu¹, Hsi-Hsuan Yen¹

1. Industrial Technology Research Institute, Taiwan

Preliminary Demonstration of Ultra Compact Pico Projector with Micro-Pixelated GaN LED Imager

Preliminary demonstration of ultra-compact pico-projector with micro-pixelated GaN LED imager was given. With 1.5cm³ projection lens, projector size of around 2 cm³ was achieved. The micro-pixelated LED imager features high luminance and collimating beams.

High Power Laser Technology and High Energy Density Physics

4700-PO-10

Heinrich Hora², Hui-Chun Wu¹, Kirk Flippo¹

1. P-24 Plasma Physics, Los Alamos National Laboratory, USA
2. Department of Theoretical Physics, University of New South Wales, Australia

Relativistic Laser Beam Stabilization of Plane Geometry Target Interaction by Nonlinear Forces

For quiver energies of electrons in a laser field close to the relativistic threshold, the interaction front with a target is stabilized based on relativistic properties against Rayleigh-Taylor instabilities

4700-PO-11

Jaehoon Kim¹, Seung Hoon Yoo¹, Geun Ju Kim¹

1. Korea Electrotechnology Research Institute, Korea

Electron Energy Enhancement using Plasma Density Increment in Laser Wakefield Acceleration

The effect of the density increment structure in the laser wakefield acceleration on the electron energy is studied using 2D PIC simulation and experiment with 20 TW laser. Due to the acceleration field structure the electron energy can be enhanced. The experimental results show the electron energy enhancement by using density increment structure.

4700-PO-12

Lai Lin¹, Zhou Jin¹, Zhao Yuxin¹, Shao Yan¹

1. National University of Defence Technology, China

Application Study of ALN Method on the Gasdynamic Laser Nozzle Design

ALN method which can obtain shorter nozzle length and bigger small signal gain than MLN method is applied to nozzle design of gasdynamic lasers and is proved to be the most advanced design method.

Solid-State Laser and Other Lasers, and Laser Materials

4700-PO-13

Heonsu Jeon^{1,2}, Sihan Kim¹, Sunghwan Kim¹

1. Department of Physics and Astronomy & ISRC, Seoul National University, Korea
2. Department of Biophysics and Chemical Biology, Seoul National University, Korea

Room-temperature Continuous-wave Operation of Photonic Crystal Band-edge Laser with Long Lifetime

We report continuous-wave (CW) operation of photonic crystal (PC) lasers with long lifetime over 10 hours, a challenging task for PC lasers to be considered as realistic and viable photonic devices.

4700-PO-14

Ja-Hon Lin¹, Pao-Keng Yang²

1. Department of Electro-Optical Engineering, National Taipei University of Technology, Taiwan
2. Department of Opto-electronic System Engineering, Ming-Hsin University of Science and Technology, Taiwan

Passive Mode Locking of C-cut Nd:LuVO₄ Laser by the SESAM at 1086 nm

By proper design the reflectance band of the SESAM, the passive mode locking has been first time demonstrated in c-cut Nd:LuVO₄ laser with the center wavelength at 1086 nm and the pulsewidth about 144 ps.

4700-PO-15

Junichiro Kojou¹, Yusuke Kikuchi¹, Fumihiko Kannari¹

1. Keio University, Japan

Characteristics of Multi-line Oscillation of Visible Pr³⁺-doped ZBLAN Fiber Lasers Pumped by GaN Diode Lasers

Multi-line oscillation characteristic of Pr³⁺-doped ZBLAN fiber and its tunability are experimentally studied in the visible regions (green (522nm), orange (604nm), red (635nm)). Single line oscillation is also demonstrated with birefringent filters.

4700-PO-16

Daniel J. Thompson¹, Robert E. Scholten¹

1. Centre of Excellence for Coherent X-ray Science, School of Physics, The University of Melbourne, Australia

Narrow linewidth tunable ECDL using wide bandwidth filter

We show how an external cavity diode laser with interference filter for wavelength selection can operate on a single external cavity mode, even when the filter bandwidth is hundreds of times greater than the external cavity mode spacing, and many times greater than the intrinsic laser diode mode spacing.

4700-PO-17

Boxia Yan¹, Yong Bi¹, Dong Dong Wang², Yan Qi¹, Guang Zheng¹, Hua Cheng¹, Tao Fang¹, Bin Wang¹, Yanwei Wang¹

1. Academy of Opto-Electronics, Chinese Academy of Science, China
2. Phoebus Vision Opto-Electronics Technology Ltd, China

Compact and Highly Efficient 3.4W Intracavity Frequency-doubled Green Laser Based on PPMgLN

A compact and highly efficient green-light source has been demonstrated based on periodically poled MgO:LiNbO₃ (PPMgLN). A maximum power of 3.4 W at 532 nm is obtained by a 6.0W LD pumped, the PPMgLN length is only 2mm, and the corresponding optical to optical conversion efficiency is 56%.

4700-PO-18

Gerald M Bonner^{1,2}, Huajin Zhang³, Jiyang Wang³, Alan J Kemp², Helen M Pask¹

1. MQ Photonics, Macquarie University, Australia
2. Institute of Photonics, University of Strathclyde, UK
3. State Key Laboratory of Crystal Materials, Shandong University, China

Continuous-wave SrMoO₄ Intracavity Raman Laser Pumped Using a Disk Laser

The use of disk lasers to pump continuous-wave (cw) intracavity Raman lasers is discussed with respect to power scaling these devices via improved thermal management. One such laser based on SrMoO₄ and Nd:YVO₄ is reported.

4700-PO-19

Qing Wang¹, Zhiyi Wei¹, Zhiguo Zhang¹, Shenzhou Lu², Qihong Yang²

1. Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, China
2. School of Materials Science and Engineering, Shanghai University, China

Diode-pumped Continuous-wave Triwavelength Ceramic Nd:Y_{1.8}La_{0.203} Laser

We demonstrated triwavelength operation in a diode pumped ceramic Nd:Y_{1.8}La_{0.203} laser. Output power of 546 mW was achieved under an absorbed pump power of 6.2 W, corresponding to a slope efficiency of 10.9%.

4700-PO-20

O. Kitzler¹, A. Sabella¹, B.F. Johnston¹, A. McKay¹, R.P. Mildren¹

1. MQ Photonics Research Centre, Macquarie University, Sydney, Australia

Design and Characterisation of Optical Quality Single Crystal Diamond for Raman Laser Applications

We report measurements of parameters important to Raman laser design for single crystal synthetic diamond. Raman laser operating space is assessed as functions of the pump wavelength, temporal format and design architecture.

4700-PO-21

Michal Jelínek¹, Ondrej Kitzler¹, Helena Jelínková¹, Jan Sulc¹, Michal Nemeč¹, Vaclav Kubeček¹

1. Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Education, Czech Republic

CVD-Diamond External Cavity Raman Laser Operating at 1632 nm

CVD diamond Raman laser with external cavity operating at 1632 nm is demonstrated for the first time. Output energy of 25 uJ in the 6 ns long pulse with the fundamental spatial profile was obtained.

Applied Nonlinear Optics

4700-PO-22

Changsoo Jung¹, Woojin Shin¹, Bong-Ahn Yu¹, Yeung Lak Lee¹, Young-Chul Noh¹

1. Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Korea

Efficient 355-nm beam generation using a birefringent walk-off compensator

We demonstrate a simple method for compensating walk-off in frequency tripling of 1064-nm beam. A birefringent crystal was used as the compensator and improved the tripling efficiency by 19%.

4700-PO-23

Feng Sujuan¹, Mao Qinghe¹, Chang Jianhua¹, Jiang Jian¹, Liu Wenqing¹

1. Anhui Institute of Optics and Fine Mechanics, China

Mid-IR Difference Frequency Generation Based on Fiber Lasers

We demonstrate a new miniaturized fiber-type CW mid-IR DFG laser source based on the QPM technique, which uses a PPLN as the nonlinear crystal, and an YDFL and an EDFL as the fundamental sources.

4700-PO-24

Kevin Cook², John Canning², Roberson A. Oliveira¹, Alexandre A. P. Pohl¹

1. Federal University of Technology, Brazil

2. Interdisciplinary Photonics Laboratories, School of Chemistry, University of Sydney, Australia

The Acousto-Optic Effect Applied to Bragg Grating Writing

The application of the acousto-optic effect to an optical fibre during Bragg grating inscription is demonstrated. Through the excitation of flexural or longitudinal acoustic waves, different permanent effects are achieved in the gratings.

4700-PO-25

Yana V. Izdebskaya¹, Anton S. Desyatnikov¹, Gaetano Assanto², Yuri S. Kivshar¹

1. Nonlinear Physics Center, Research School of Physics and Engineering, The Australian National University, Australia

2. NooEL-Nonlinear Optics and OptoElectronics Lab, Department of Electronic Engineering, University of Rome, Italy

Multimode Waveguides in Nematic Liquid Crystals

We report on the first experimental observation of higher-order modes guided by soliton-induced waveguides in nematic liquid crystals, identifying the power domains where guided modes are supported.

4700-PO-26

Do-Kyeong Ko^{1,2}, Nan Ei YU¹, Ju Won Choi², Heejong Kang², Jung Hoon Ro³

1. Advanced Photonics Research Institute, GIST Korea

2. Graduate program of Photonics and Applied Physics, GIST, Korea

3. Department of Biomedical Engineering School of Medicine, Pusan Nat'l Univ, Korea

Fabrication of Uniform QPM Device using Negative Multiple Pulse Poling Method

We introduced a novel negative multiple pulse poling (NMP) method for uniform device fabrication of quasi-phase matching using an in-situ visualization system. Diffraction pattern analysis showed the duty ratio of 0.42, and the standard deviation of 0.02 which means the uniform quality of the whole poled area.

4700-PO-27

Li-Chuan Tang¹, Yia-Chung Chang^{1,2}, Jung-Yau Huang², Chen-Shiung Chang²

1. Research Center for Applied Sciences (RCAS), Academia Sinica, China

2. Department of Photonics & Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan.

The frequency-dependent nonlinear optical responses of the ternary nitrides via the first-principles calculations

We study the frequency-dependent nonlinear optical properties of the orthorhombic (wurtzite) ternary nitride tetrahedral semiconductors, i.e. ZnGeN₂ and the related ternary nitrides based on the Linear Augmented Slater-Type Orbitals (LASTO) method.

Infrared and THz Technology, and Astrophotonics

4700-PO-28

Anthony Horton¹, Michael Goodwin¹, Brian Baumgartner¹, Tobias Feger¹

1. Australian Astronomical Observatory, Australia

The Effect of Core Geometry on Focal Ratio Degradation in Optical Fibres for Astronomy

Focal ratio degradation (FRD) in multimode optical fibres is an important constraint on the design of fibre fed astronomical instrumentation. We have investigated the on FRD of fibre core geometry, including square and hexagonal cross-sections.

4700-PO-29

Nick Cvetojevic^{1,2,3}, Nemanja Jovanovic^{1,2,3}, Chris Batters⁴, Jon Lawrence^{1,2,3}, Joss Bland-Hawthorn⁴, Mick Withford^{1,2,3}

1. MQ Photonics research centre, Dept. of Physics & Astronomy, Macquarie University, Australia

2. Centre for Astronomy, Astrophysics and Astrophotonics, Dept. of Physics & Astronomy, Macquarie University, Australia

3. Australian Astronomical Observatory, Australia

4. Sydney Institute for Astronomy, School of Physics, University of Sydney, Australia

5. Centre for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS), Macquarie University, Australia

Technology for Telescope Integration of the Integrated Photonic Spectrograph Prototype

We provide details on recent the characterization of arrayed-waveguide based Integrated Photonic Spectrograph chips, in particular the demonstration of simultaneous multiple input fibers that greatly increase its observational efficiency, and the three-fold increase in resolving power with slight modification of the chip structure. Further, we outline the setup that will be used in the first on-telescope prototype at the Anglo-Australian Telescope (AAT).

4700-PO-30

Nemanja Jovanovic^{1,2,3}, Sarah Armatys^{1,2}, Simon Gross^{1,4}, Peter Tuthill⁵, Jon Lawrence^{1,2,3}, Michael Withford^{1,4}

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2. Centre for Astronomy, Astrophysics and Astrophotonics, Macquarie University, Australia

3. Australian Astronomical Observatory, Australia

4. Centre for Ultrahigh Bandwidth Devices for Optical Systems (CUDOS), Australia

5. Sydney Institute for Astronomy (SIFA), Australia

Prospects for Integrated Photonics in Space Applications

In this paper we explore the effects of space-like conditions, including temperature, pressure, and exposure to x-rays and gamma rays, on waveguides fabricated in glass by the femtosecond laser direct write technique.

ACOFT Presentation

4700-PO-31

Do-Kyeong Ko^{1,2}, Kyu-Sup Lee¹, S. Takekawa³, K. Kitamura³, Nan Ei Yu²

1. School of Photon Science and Technology, Gwangju Institute of Science and Technology, Korea

2. Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Korea

3. National Institute for Materials Science, Japan

Simultaneous Generation and Detection of Narrow-band Terahertz Waves with a Quasi-phase Matching Crystal

We present a more-developed method where narrow-band terahertz (THz) waves are simultaneously generated and detected at one quasi-phase matching crystal. For THz detection, we used a photodiode as a THz detector via parametric interaction between THz wave and weak probe beam, compare to the photoconductive antenna or electro-optic sampling methods.

ACOFT Presentation

4700-PO-32

Jung-Sheng Chiang¹, Yun-Hsuan Hsu¹, Nai-Hsiang Sun¹, Shih-Chiang Lin²

1. Department of Electrical Engineering, I-Shou University, Taiwan

2. Department of Communication Engineering, I-Shou University, Taiwan

A Novel Approach for Modal Analysis of Terahertz Photonic Crystal Fibers

Vector boundary element method is proposed to analyse the guided modes of terahertz photonic crystal fibers. The results are evaluated the fundamental mode and high-order mode field distribution for terahertz photonic crystal fiber.

4700-PO-33

Julian Steele¹, Roger Lewis¹

1. University of Wollongong, Australia

Optical Reflectance Studies of GaAs1-xBix

Here we investigate the optical reflectance of GaAs_{1-x}Bi_x of He-Ne laser irradiation and employing a geminated ellipsoidal mirror apparatus to vary the incidence angle. We find that the refractive index determined in this way is lessened by the incorporation of Bi relative to the case of pure GaAs. We conclude this direct optical method may serve as a useful means of estimating Bi incorporation.

Integrated and Guided-Wave Optics and Thin Film Optics

4700-PO-34

Thomas Meany^{1,2}, Qiang Liu^{1,2}, Nemanja Jovanovic^{1,2}, Graham D. Marshall^{1,2}, M. J. Steel^{1,2}, Michael J. Withford^{1,2}

1. Centre for Ultrahigh Bandwidth Devices for Optical Systems (CUDOS), Australia
2. MQ Photonics Research Centre, Dept. of Physics and Astronomy, Macquarie University, Australia

Polarization Dependent Coupling in Waveguide Arrays

Photonic devices for quantum logic require tight control over their birefringent properties. In this study we seek to better understand the influence of birefringence in coupled waveguide systems and establish boundary conditions for future quantum photonic systems.

4700-PO-35

Jongki Kim¹, Woosung Ha¹, Junki Kim², Bjorn Paulson¹, Kyunghwan Oh¹

1. Institute of Physics and Applied Physics, Yonsei University, Korea
2. Wellman Center for Photomedicine, Harvard Medical School, USA

Variation of Beam Shape Properties with Multimode Emergence in Optical Fiber

We calculated and observed FZP focusing properties with HPCF. The simulated beam waist was 6.91 μ m when 22 modes were mixed. The predicted value when 100,000 modes were mixed was 35 μ m, which was similar to the value of the observed beam waist, at 45 μ m.

4700-PO-36

Yang-Tung Huang¹, Ming-Shun Hsu¹

1. Institute of Electronics, National Chiao Tung University, Taiwan

Design, Fabrication, and Characterization of Si-Based Dual ARROW Power Splitters

Si-based dual ARROW power splitters with a separation width of 30 μ m and a length of coupling region as 2150 μ m were designed and fabricated. The average imbalances, standard deviations, and propagation losses of the fabricated devices will be discussed.

4700-PO-37

Kyungtaek Min¹, Yun-Kyoung Choi¹, Heonsu Jeon^{1,2}

1. Department of Physics and Astronomy, Seoul National University, Korea
2. Department of Biophysics and Chemical Biology (WCU), Seoul National University, Korea

Enhanced photoluminescence from one-dimensional photonic crystal light-emitting structure

We propose a novel scheme for enhanced photoluminescence. This enhancement is due to photon-recycling near the photonic band-edge. Performance of the proposed structure is examined using transfer-matrix method and plane-wave expansion method.

4700-PO-38

Huai-Yi Xie¹, Shih-Hsin Hsu¹, Yia-Chung Chang¹

1. Research Centre for Applied Sciences, Academia Sinica, Taiwan

Spherical Harmonics-Based Green's Function Approach For Light Scattering From Periodically Or Randomly Distributed Spherical Metallic Nanoparticles On A Substrate

We present high-efficient Green's function method based on expansion in terms of spherical harmonics to investigate the optical properties of periodically or randomly distributed spherical metallic particles on a substrate.

4700-PO-39

Alex Fuerbach¹, Christopher Miese¹, Michael J. Withford¹

1. Centre for Ultra-high bandwidth Devices for Optical Systems, Macquarie University, Australia

Femtosecond Laser Direct-written Waveguides in Bismuth Germanate for Spatial Resolved Radiation Detection

We demonstrate direct laser written low loss waveguides in bismuth germanate for sensing applications in high energy physics. We discuss the suitability of waveguide arrays in this material for spatial resolved radiation detection.

Information Optics, Optical Storage and Displays

4700-PO-40

Junghun Jung¹, Byoung-Sub Song¹, Sang-cheol Yoon¹, Gilbae Park², Byoung-ho Lee², Sung-Wook Min¹

1. Department of Information Display, Kyung Hee University, Korea
2. School of Electrical Engineering, Seoul National University, Korea

Real-time Depth-fused Three-dimensional Display System

Real-time depth-fused three-dimensional display which consists of the projector, the polarization modulator, the selective scattering film and the depth camera is proposed. The proposed system gives the depth using the accommodation cue not the binocular disparity.

4700-PO-41

Bin Wang¹, Minyuan Sun¹, Yong Bi¹, Yan Qi¹, Guang Zheng¹, Tao Fang¹, Yanwei Wang¹, Boxia Yan¹, Hua Cheng¹

1. Academy of Opto-electronics, China Academy of Science, China

Embedded Speckle Measurement Instrument Design and Quantified Speckle Evaluation of A 71 inch Laser TV

An embedded speckle measurement instrument was designed for the quantified evaluation of the 71 inch laser TV. The validity of the result is verified. The effect of the speckle removal unit is characterized.

4700-PO-42

Minyuan Sun¹, Bin Wang¹, Yong Bi¹, Yan Qi¹, Guang Zheng¹, Tao Fang¹, Yanwei Wang¹, Boxia Yan¹, Hua Cheng¹

1. Academy of Opto-electronics, Chinese Academy of Science, China

Application of Auto White Balance Control in Giant Screen Splicing Laser Projection System

The splicing laser projection system is reported which consist of five splicing subsystems. The total projection area covers 100 square meters and the system has total flux output of 75000lm. The fluctuation of luminance is 2% and chromaticity drift is 0.002 with the auto white balance controller we designed.

4700-PO-43

Hee-Jin Choi¹

1. Sejong University, Korea

Analysis on the Required MPRT of Stereoscopic 3D Display

An analysis on the required motion picture performance of stereoscopic 3D image is proposed. The proposed analysis is based on the human visual system and the motion picture response time (MPRT).

4700-PO-44

Shiuan Huei Lin¹, Po-lin Chen², Ken Y. Hsu²

1. Department of Electrophysics, National Chiao Tung University, Taiwan
2. Institute of Electro-Optical Engineering & Department of Photonics, National Chiao Tung University, Taiwan

Polarization Holographic Recording in Bulk Phenanthrenequinone-doped Poly (methyl methacrylate) Photopolymer

In this paper, we present our investigations on polarization holographic recording in 9, 10-phenanthrenequinone-doped poly (methyl methacrylate) photopolymer. We demonstrate that a polarization grating can be recorded in such material using two orthogonal polarization beams. The experimental results show that the diffraction efficiency of the hologram reaches to ~40%, and the dynamic range of material (M#) reaches to 1.82 by using two orthogonal circularly-polarized beams.

4700-PO-44B

Hone-Ene Hwang¹, Hsuan-Ting Chang Chang², Cheng-Ling Lee³, Ming-Chun Chien¹

1. Department of Electronic Engineering, Chung Chou Institute of Technology, Taiwan
2. Photonics and Information Laboratory, Department of Electrical Engineering, Taiwan
3. Department of Electro-Optical Engineering, National United University Taiwan

Multiple-image Encryption Based on Position Multiplexing in Fresnel Transform Domain

A method of position multiplexing based on modified Gerchberg-Saxton algorithm and cascaded phase modulation scheme in Fresnel-transform domain is proposed in multiple-image-encryption framework. Simulation results show that crosstalk between multiplexed images has been significantly reduced.

Optical Communications and Networking

4700-PO-45

Kiyonobu Mozawa¹, Weifan Qiao¹, Ken Kashiwagi¹, Takashi Kurokawa¹

1. *Tokyo University of Agriculture and Technology, Japan*

Dark Soliton Generation using Optical Pulse Synthesizer

We have successfully generated dark solitons with pi phase shift using an optical pulse synthesizer. The fiber transmission characteristics of the generated dark solitons have been investigated by both a measurement and a simulation.

4700-PO-46

Shunsuke Hohchido¹, Yu Matsunaga¹, Ken Kashiwagi¹, Yosuke Tanaka¹, Takashi Kurokawa¹

1. *Tokyo University of Agriculture and Technology, Japan*

Heterodyne Detection in DWDM Transmission using Frequency-Comb Light Source

We have demonstrated a heterodyne detection in a DWDM transmission system with an OFC-based multicarrier light source. The error-free 1-Gbps DWDM transmission with 25-GHz spacing has been achieved over 10-km.

4700-PO-47

Adam Mullavey¹, Bram Slagmolen¹, Daniel Shaddock¹, Jong Chow¹, John Miller¹, David McClelland¹

1. *The Centre for Gravitational Physics, The Australian National University, Australia*

Fibre Phase Noise Cancellation for Long Baseline Optical Networks

We demonstrate a technique for the stable transfer of an optical frequency reference over a kilometre scale optical fibre link. The fractional frequency stability achieved is as low as 1.7×10^{-18} /√Hz.

4700-PO-48

Jhe-Min Lin¹, Wen-Jeng Ho¹, Jheng-Jie Liu¹, Yi-Yu Lee¹, Yi-Chia Hsieh¹, Hsuan-Ming Tang¹

1. *Institute of Electro-Optical Engineering, National Taipei University of Technology, Taiwan*

Reducing in Dark Count Rate Using a Dual-APDs Balanced-Capacitance Self-Differencing Scheme for 1550 nm Single Photon Detection Applications

Single-photon performances characterization of InGaAs/InP avalanche photodiodes (APDs) using a dual-APDs balanced-capacitance self-differencing operation was proposed. Small spike-noise and low discrimination-level were simultaneously achieved. Reducing in dark-count rate was also presented in the proposed scheme.

ACOFI Presentation

Laser Metrology and Remote Sensing

4700-PO-49

Silvie Ngo¹, John Miller¹, Adam Mullavey¹, Daniel Shaddock¹, David McClelland¹

1. *Centre for Gravitational Physics, Australia*

Control of Optical Resonators Using Digital Interferometry

We discuss a new table-top experiment to investigate using digital interferometry, which combines heterodyne interferometry with (de)modulation techniques, as a tool for lock acquisition and cavity alignment control for future gravitational wave detectors.

4700-PO-50

Ketsaya Vacharanukul¹, Wiroj Sudatham¹, Anusorn Tonmueanwai¹

1. *National Institute of Metrology, Thailand*

Real-time Air Refractive Index Compensation of Laser Interferometer System for Step Gauge Calibration with CMM Technique

Step gauge interferometry calibrator has been developed using a four-path laser interferometer with the implementation of the real-time air refractive index compensation system. The system achieves the uncertainty of 0.7 mm (k=2) at 1 m.

4700-PO-51

Zhenyu Xu¹, Wenqing Liu¹, Ruifeng Kan¹, Jianguo Liu¹, Yujun Zhang¹, Liang Zhang¹

1. *Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China*

Line-of-sight Temperature Measurement based on TDLAS Two-line Thermometry using a Single Diode Laser

An optical sensor for line-of-sight temperature measurements based on TDLAS two-line thermometry has been developed; it utilizes a pair of water vapor absorption lines near 1.4 μm. Promising results have been demonstrated on a furnace and on an engine combustor.

4700-PO-52

Christopher Artlett¹, Helen Pask¹

1. *MQPhotonics Research Centre, Macquarie University, Australia*

Optical Remote Sensing of Water Temperature by Raman Spectroscopy Techniques

We investigate Raman-based remote sensing for the measurement of water temperature. Statistical analysis of spectral parameters is used to develop an approach for rapid temperature monitoring. A system designed to complement this technique is described.

4700-PO-53

Monluee Ranusawud^{1,2}, Pichet Limsuwan², Jedsada Wongsaroj¹, Rojana Leecharoen¹

1. *National Institute of Metrology, Thailand*

2. *King Mongkut's University of Technology Thonburi, Thailand*

Modulation Free Beam of Rubidium Stabilized Diode Laser for Short Gauge Block Interferometer

A Rubidium stabilized diode laser has been developed and has been used as standard wavelength to determine length of gauge block. The measurement uncertainty of 54 nm for 100 mm gauge block measurement was achieved.

Laser Processing, Laser Microfabrication, and Industrial Applications

4700-PO-54

David Death¹, Pavel Yaroshchik¹, John Eberhardt¹, Steve Spencer¹, Alastair McEwan¹, Dragoslav Miliinkovic¹, Vic Sharp¹, Adam Williams¹, Alvaro Catanzano¹, Stephen Rainey¹

1. *CSIRO Division of Process Science & Engineering, Australia*

Application of Laser Induced Breakdown Spectroscopy for in Situ Multi-Element Analysis of Mineral Ores

CSIRO has developed a mobile LIBS spectrometer for routine in situ quantitative multi-element analysis of mineral ores. Multivariate data analysis methods are used to facilitate analysis for a number of elements at major, minor and trace concentrations.

4700-PO-55

Chih Wei Luo¹, H. I. Wang¹, L. W. Liao¹, C. S. Yang², T. Kobayashi^{1,3}

1. *Department of Electrophysics, National Chiao Tung University, Taiwan*

2. *Graduate Institute of Electro-optical Engineering, Tatung University, Taiwan*

3. *Faculty of Informatics and Engineering, The University of Electro-Communications, Japan*

Preparation of ZnSe Nanoparticles with Femtosecond Laser

We demonstrated that a large amount of hexagonal and spherical-shape ZnSe nanoparticles with an average diameter of 16-22 nm forms on the surface of the wafer by the irradiation of fs laser pulses.

4700-PO-56

Qiang Liu¹, Martin Ams¹, Peter Dekker¹, Benjamin Johnston¹, Michael Withford¹, Michael Steel¹

1. *CUDOS, Department of Physics & Astronomy, Macquarie University, Australia*

Laser Written Waveguides in Magneto-optical Glass

For the first time we explore femtosecond laser writing of waveguides in magneto-optical glasses using athermal writing inscription. Single mode guidance at visible is demonstrated and opportunities for optional isolators will be reported.

4700-PO-57

Charles A. Rohde¹, Hayley Ware¹, Fraser MacMillan¹, Malkhaz Meladze², M. Cather Simpson¹

1. The Photon Factory, University of Auckland, New Zealand
2. Rakon Limited, New Zealand

Selective Gold Film Removal from Multilayer Substrates

Pulsed UV laser ablation is used to remove single 250nm thick gold films from doubly coated, transparent, 130- μm thick, quartz substrates (gold-quartz-gold.) Precise laser machining conditions, allow the bottom gold layer to be left unaffected.

Laser Chemistry, Biophotonics and Applications

4700-PO-58

Seungduk Lee¹, Dalkwon Koh², Areum Jo³, Hae Young Lim³, Choong-Ki Kim², Beop-Min Kim^{1,2}, Youngwook Seo², Minah Suh³

1. Department of Biomicrosystem Engineering, Korea
2. Department of Biomedical Engineering, Korea
3. Department of Life Science, Korea

Hemodynamic Responses to Direct Epidural Stimulation using NIRS (near-infrared spectroscopy) and ORIS (optical recording of intrinsic signal)

In this study, we applied simultaneous ORIS-NIRS approach to measure a cortico-cortical and cortico-thalamic interaction of hemodynamic perfusion. Our result shows that the hemodynamic responses depend on the cortical depth. Also, the outer cortex layer showed faster reaction to hemodynamic perfusion than the deep layer both for long and short term observations.

4700-PO-59

Andy Chen¹, Frederique Vanholsbeeck¹, Dean Tai³, Martin Svrcek⁴, Bruce Small²

1. Physics Department, University of Auckland, New Zealand
2. Department of Physiology, University of Auckland, New Zealand
3. Institute of Bioengineering & Technology, Singapore
4. Department of Biomedical engineering, Brno University of Technology, Czech Republic

Spectrally Resolved Measurement of Cardiac Action Potentials

Spectroscopic measurements of cardiac action potential using a high resolution spectrometer offers more insights into the complex process of spectral modulation associated with membrane potential and mechanical activity. This shows the dependence of the ratiometric behavior of Di-4-Anepps for different excitation wavelengths.

4700-PO-60

Guillaume Maucort^{1,2}, Timo Nieminen¹, Norman Heckenberg¹, Fred Meunier², Halina Rubinsztein-Dunlop¹

1. School of Mathematics and Physics, The University of Queensland, Australia
2. The Queensland Brain Institute, Australia

Biophysical Studies Of The Actin Network Action On Neurosecretory Vesicles During Stimulation Of Exocytosis.

We studied the dynamics of neurosecretory vesicles during stimulation of exocytosis and developed new analysis tools to get deeper analysis and reveal new pathways within the cell.

4700-PO-61

Hyun-Woo Jeong^{1,2}, Jung Suk Kim^{1,2}, Kyu Back Lee^{1,2}, Beop-Min Kim^{1,2}

1. Department of Biomedical Engineering, Korea University, Korea
2. Research Institute of Health Sciences, Korea University, Korea

Wetting Property Estimation of Surface Modified Micro-channels by ODT Technique

In this study, we fabricated micro-fluidic chambers (0.4mm x 0.4mm) with surface modified quartz plates and estimated flow dynamics correlated with different contact angles of chamber walls using optical Doppler tomography technique

4700-PO-62

Yiqing Lu^{1,2}, James A. Piper¹, Yujing Huo², Dayong Jin¹

1. Advanced Cytometry Labs, MQ Biofocus Research Centre, Macquarie University, Australia
2. Department of Electronic Engineering, Tsinghua University, China

Cytometric Investigation of Rare-Events Featuring Time-Gated Detection and High-Speed Stage Scanning

We report a time-gated luminescence cytometric strategy to detect rare-event waterborne pathogens. The prototype system is capable of analysing a 15mm x 15mm slide containing as rare as 13 europium-labeled Giardia cysts within 5 minutes.

4700-PO-63

James Bennett¹, Bastian Baudisch¹, Daryl Preece¹, Timo Nieminen¹, Norman Heckenberg¹, Halina Rubinsztein-Dunlop¹

1. The University of Queensland, School of Mathematics and Physics, Australia

'Wiggler-Waggler'- Optical Measurements of Complex Viscoelastic Moduli

We demonstrate the simultaneous optical measurement of the viscoelastic modulus at many frequencies by active rotational 'Fourier' microrheology. This was achieved by employing a birefringent vaterite microsphere probe in a dual-beam optical tweezers apparatus.

4700-PO-64

Seunghyun Yoon¹, Youngkyu Park², Hee-Dok Choi², Kyuman Cho^{1,2}

1. Interdisciplinary Program of Integrated Biotechnology, Sogang University, Korea
2. Department of Physics, Sogang University, Korea

High Sensitivity Readout Sensor for a Fluidic Channel Using an Exactly Balanced Heterodyne Interferometer

A new, very well balanced heterodyne interferometer scheme which suffers very low common mode drift is described. Potential use of this novel interferometer for readout sensor of a biochemical reaction is discussed. Our preliminary measurement results show that an 8.7x10⁻⁷ refractive index unit can be measured.

4700-PO-65

Timo A. Nieminen¹, Alexander B. Stilgoe¹, Lan T. P. Nguyen¹, Halina Rubinsztein-Dunlop¹

1. The University of Queensland, Australia

Thermodynamics of Optical Tweezers

We discuss the measurement of the gradient and scattering forces based on a thermodynamic treatment of optical tweezers.

4700-PO-66

Myoung-Kyu Oh¹, Joon Heon Kim¹, Young-Ho Park¹, Hoonsoo Kang¹

1. Gwangju Institute of Science and Technology, Korea

Frequency-Shifted Optical Feedback-Cavity Ring-down Spectroscopy

Cavity ring-down spectroscopy employing self-injection seeding lock of diode laser by frequency-shifted optical feedback was introduced. Experiments unveiled the mechanisms locking the laser frequency to the cavity resonance and showed that our scheme is very useful for compact and hyper-sensitive gas analyzers.

Fiber Amplifiers, Lasers, Sensors and Devices

4700-PO-67

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1. School of Electrical Engineering, The University of New South Wales, Australia
2. School of Chemistry, University of Sydney, Australia
3. Faculty of Electrical Engineering, University Teknologi, Malaysia

Intensity-Type Vibration Sensor Based on Multiple Subchannels Sensing Scheme

A novel intensity-type vibration sensor using multiple phase-shifted fiber Bragg grating (MPS-FBG) pair is proposed to improve vibration sensitivity of a system interrogated by broadband source. The enhanced vibration sensitivity compared to normal FBG is accomplished by the increased of total intensity change produced by multiple subchannels operation. Significant vibration sensitivity enhancement has been achieved compared to the normal FBG in experiment (e.g. nearly 20 dB using 17 phase shifted FBG), which

agrees with the theoretical expectation. The improved sensitivity of the proposed scheme would be highly desirable for cost effective wavelength multiplexed vibration sensing system based on single broadband source.

ACOFT Presentation

4700-PO-69

Zhiyong Yang¹, Megan Fah¹, Kelly Reynolds², Jonathan Sexton², Pierre Lucas¹

1. *Department of Materials Science and Engineering, University of Arizona, USA*
2. *Mel and Enid Zuckerman College of Public Health, University of Arizona, USA*

Detection of Bio-molecules using Conductive Chalcogenide Glass Sensor

Novel telluride glasses with high electrical conductivity, wide mid-infrared transparency and good resistance to crystallization are used to design an opto-electrophoretic sensor for detection and identification of hazardous microorganisms.

4700-PO-70

Kuo-Hsiang Lin¹, Cheng-Ling Lee¹

1. *Department of Electro-Optical Engineering, National United University, Taiwan*

Analysis of Leaky-Guided Modes in Multimode Fiber Interferometers

We have proposed a multimode fiber interferometer based on leaky-guided modes interference mechanism. The interference fringes of the leaky-guided modes in the device are observed experimentally and analytically investigated in the study.

ACOFT Presentation

4700-PO-71

Changxi Yang¹, Lingjie Kong¹, Xiaosheng Xiao¹

1. *State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instruments, Tsinghua University, China*

Polarization Dynamics in Dissipative Soliton Fiber Lasers Mode-Locked by Nonlinear Polarization Rotation

Based on coupled Ginzburg-Landau equations and Jones matrixes, we numerically studied the polarization dynamics in dissipative soliton fiber lasers mode-locked by nonlinear polarization rotation. It is found that the components at two polarization axes are of different energies and spectra, which are intrinsic conditions of high-energy pulse generation. Besides, the non-uniform polarization rotation in dissipative soliton fiber lasers can act as a spectral filter, assisting mode-locking.

4700-PO-72

Atsushi Taketomi¹, Yuki Wada¹, Takuya Inoue¹, Junichi Matsuura¹, Yasuhiro Kamba¹, Jun Enokidani², Kazuyoku Tei¹, Shin Sumida², Shigeru Yamaguchi¹

1. *Tokai University, Japan*
2. *Seikoh Giken Co.Ltd., Japan*

All fiber high power picosecond laser

A high power picosecond laser was demonstrated in an all fiber MOPA configuration. The maximum power was 12W and the UV output at 355nm was 2.9W with 44MHz repetition rate and 5.6ps duration.

4700-PO-73

Tetsuya Matsuyama¹, Kenji Wada¹, Hiromichi Horinaka¹

1. *Osaka Prefecture University, Japan*

Simple Method For Reconstructing Amplitude and Phase of Optical Pulse Free From Autocorrelation Measurement

We investigate the feasibility of the simple method for reconstructing an optical pulse free from autocorrelation measurements, which is based on the iterative calculation using only the fundamental and the second harmonic power spectrum.

4700-PO-74

Gino Putrino¹, Adrian Keating², Mariusz Martyniuk¹, Lorenzo Faraone¹, John Dell¹

1. *School of Electrical, Electronic, and Computer Engineering, The University of Western Australia, Australia*
2. *School of Mechanical Engineering, The University of Western Australia, Australia*

A Novel Optical Read-out Technology for Large Arrays of Micromachined Cantilever Sensors

A novel, optical approach to the interrogation of MEMS cantilever sensors is discussed. We investigate the effects of placing a diffraction grating in a Si waveguide below a

cantilever arm, to create a resonant cavity.

4700-PO-75

Shao Hao Wang¹, **P. K. A. Wai²**

1. *Fuzhou University, China*
2. *The Hong Kong Polytechnic University, China*

Phase Contribution of Raman Assistance to Phase Sensitive Fiber Optical Parametric Amplifiers

We demonstrated that the phase contribution from Raman assistance can increase not only the peak gain and bandwidth of individual gain band of phase-sensitive fiber optical parametric amplifiers, but the number of gain bands.

4700-PO-76

JerShien Chen¹, San-Liang Lee², Hen-Wai Tsao³, Sheng-Xian Wang³

1. *Intellectual Property Office, Taiwan*
2. *Department of Electronic Engineering, National Taiwan University of Science and Technology, Taiwan*
3. *Graduate Institute of Electronic Engineering, National Taiwan University, Taiwan*

Modeling Grating Phase Variation at Facet for Two-Section DFB Lasers Internal Optical Field Patterns

We apply the finite-difference method to the dynamic internal optical field analysis for a two-section distributed feedback laser, get the dynamic internal optical field patterns under high frequency self-pulsation, and compare the cases with/without AR-coating. The relationship among output waveform, dynamic internal optical field patterns, and phase variation is also studied.

4700-PO-77

Tae-Jung Ahn¹, Hoe Seok Jeong¹, José Azaña²

1. *Department of Photonic Engineering, Chosun University, Korea*
2. *Institut National de la Recherche Scientifique, Canada*

Optical differentiators based on directional coupler with dissimilar waveguides

We have proposed wavelength-selective directional couplers with dissimilar waveguides designed for ultrafast optical differentiation within the femtosecond regime (corresponding to processing bandwidths > 10 THz) in simulation.

4700-PO-78

Christopher Kalnins¹, Heike Eborndorf-Heidepreim¹, Alastair Dowler¹, Tanya Monro¹

1. *Institute for Photonics and Advanced Sensing, University of Adelaide, Australia*

Fabrication of fluoride phosphate glass optical fibres for UV applications

Fluoride phosphate glasses have been studied as an alternative glass material to lead silicate for fabricating optical fibres for sensing applications. Fabrication and characterisation results are presented.

4700-PO-80

S.T. Lin³, T.D.Wang¹, H.L. Chang², Chii-Chang Chen¹

1. *Department of Optics and Photonics, National Central University, Taiwan*
2. *Chung-Shan Institute of Science & Technology, Taiwan*
3. *Department of Photonics, Feng Chia University, Taiwan*

High-power Master Oscillation Power Amplifier with Large-mode-area Yb-doped Fiber

In this paper, we report a master-oscillator fiber power amplifier system at 1061 nm by using a 4 m long Yb-doped large mode area (LMA) double-clad fiber as the gain medium.

4700-PO-81

Yoshinobu Maeda¹, Hirokazu Tanimoto¹

1. *School of Science and Engineering, Kinki University, Japan*

Negative Feedback Optical Amplification Effect in Erbium-doped Fiber Amplifiers

A negative feedback optical amplifier was demonstrated using negative feedback based on cross-gain modulation in an erbium-doped fiber amplifier. The optical amplifier is capable of providing an output signal whose gain and waveforms are stabilized.

4700-PO-81B

Honggu Choi¹, Minkyu Park¹, Woosung Ha¹, Kyunghwan Oh¹

1. Department of Physics, Yonsei University, Korea

Micro Fluidic Channel Actuator by Photon Momentum Transition

We have demonstrated optical force induced by photon momentum transition within optical fiber. By filling Refractive Index Liquid (RIL) in Hollow Optical fiber the radiation pressure at liquid core region manipulates RIL.

IQEC

Quantum Optics

4700-PO-82

Xiaoying Li¹, Liang Cui¹, Ningbo Zhao¹, Kang Gao¹

1. Tianjin University, China

Spectral Properties of Photon Pairs Generated by Spontaneous Four Wave Mixing in Inhomogeneous Photonic Crystal Fibers

The theoretical analysis shows the un-uniform dispersion of photonic crystal fiber with inhomogeneous structure will lead to modulated spectra of photon pairs, and our experimental observations agree with the theoretical predictions.

4700-PO-83

William Soo¹, Andrew Doherty¹

1. University of Sydney, Australia

Switching Phenomena in Bifurcation Amplifiers

4700-PO-84

Yoko Miyamoto¹, Daisuke Kawase², Mitsuo Takeda¹, Keiji Sasaki², Shigeki Takeuchi^{2,3}

1. Department of Engineering Science, The University of Electro-Communications, Japan
2. Research Institute for Electronic Science, Hokkaido University, Japan
3. The Institute of Scientific and Industrial Research, Osaka University, Japan

Verification of Non-classical Correlation in Orbital Angular Momentum of Photons without Excess Components

We propose a method to detect photons in superposition of orbital angular momentum states without excess components using a hologram and path interferometer, and its application to verification of non-classical correlation in photon pairs.

4700-PO-85

Xiaoying Li¹, Xiaoxin Ma¹, Liang Cui¹, Xueshi Guo¹, Lei Yang¹, Nannan Liu¹

1. Tianjin University, China

Temporal Coherence Property of Individual Beam Generated from Spontaneous Four Wave Mixing: Influence of Chromatic Dispersion Induced Chirp

The temporal coherence property of individual beam from spontaneous four wave mixing in optical fibers is experimentally investigated by introducing different amount of chirp into either the pulsed pump or individual signal (idler) beam.

4700-PO-86

Bixuan Fan¹, Thomas Stace¹, Gerard Millburn¹, Göran Johansson², Christopher Wilson²

1. School of Mathematics and Physics, The University of Queensland, Australia
2. Microtechnology and Nanoscience, Chalmers University of Technology, Sweden

A Practical Photon-number-resolving Detector in the Microwave Regime

We present a scheme for microwave photon detection via cross Kerr nonlinearity between two microwave fields mediated by a transmon. We demonstrate that every control photon can induce about 0.02 rad probe phase shift.

ACOFI Presentation

4700-PO-87

Till Weinhold^{1,2,3}, Matthew Broome^{1,2,3}, Andrew White^{1,2,3}

1. Centre for Engineered Quantum Systems, Australia
2. Centre for Quantum Computation and Communication Technology, Australia
3. School of Mathematics and Physics, The University of Queensland, Australia

Creating Narrow-band Single Photons Suitable for Gradient Echo Quantum Memories

Quantum memories based on atomic systems have bandwidth many orders of magnitude narrower than single photons from parametric down-conversion. Tailored made cavity systems are required to shape the photons bandwidth for storage in the memory.

Quantum Science in Atoms, Molecules and Solids

4700-PO-88

Torsten Gaebe¹, Carlo Bradac¹, Jerson Chen², Philip Hemmer², James Rabeau¹

1. Macquarie University, Australia
2. Texas A&M, USA

Size Reduction of Nanodiamonds Hosting NV Centres via Air Oxidation

Annealing nanodiamonds in air can be used as a simple tool to reduce the size of the nanodiamond, which is crucial for some diamond based applications like bio tracking and magnetometry.

Cold Atoms and Molecules

4700-PO-89

Ki-Se Lee¹, Sang Bum Lee², Sang Eon Park², Taeg Yong Kwon², Jaewan Kim¹

1. Department of Physics, Myongji University, Korea
2. Division of Physical Metrology, KRISS, Korea

A Compact Low Noise High Power Phase-Locked Laser System for Atom Interferometry

A compact phase-locked laser system of low noise and high power is built for our mobile atom interferometer. Light from a single laser diode is modulated by an EOM, carrier mode removed by a Fabry-Perot cavity, and amplified by a single TA chip.

4700-PO-90

Danny Baillie¹, Blair Blakie¹, Ashton Bradley¹

1. Jack Dodd Centre for Quantum Technology, Dept. of Physics, University of Otago, New Zealand

Finite Temperature Theory of Cold Gases in Interesting Potentials

We present a range of applications of finite temperature meanfield theory to cold gas systems including optical lattices, toroidal traps and dipolar interactions.

4700-PO-91

J.E. Debs¹, P.A. Altin¹, T.H. Barter¹, D. Öring¹, G.R. Dennis¹, R.P. Anderson², G. McDonald¹, J.D. Close¹, N.P. Robins¹

1. Department of Quantum Science, The Australian National University, Australia
2. School of Physics, Monash University, Australia

Comparing Thermal and Lasing Atomic Sources for Precision Inertial Measurement

We present the first experimental comparison of thermal and lasing atomic sources used in gravimeter. We achieve the highest fringe visibility to date, and show that dephasing will not limit precision at beyond state-of-the-art sensitivity.

4700-PO-92

Stuart Szigeti¹, John Debs¹, Joseph Hope¹, Paul Altin¹, Thomas Barter¹, Nick Robins¹, Daniel Doering¹, John Close¹, Gordon McDonald¹

1. *The Australian National University, Australia*

Why Momentum Width Matters for Atom Interferometry

We theoretically investigate how the momentum width of an atomic source affects the efficiency of Bragg beam-splitters and mirrors. We conclude that narrow momentum width sources are significantly more efficient than larger momentum width sources for higher order Bragg processes.

4700-PO-93

W. T. Hill, III¹ J. Lee¹

1. *Joint Quantum Institute, University of Maryland, College Park, USA*

Arbitrary Dipole Potentials for Ultracold Atoms: Free-Space Atom Chips

A phase-contrast approach to generate arbitrary, low-noise dipole potentials is described. These potentials are dynamic and can be exploited for matter simulators and investigations from novel quantum behaviour in 1-3 dimensions to atomtronics.

Quantum Information and Cryptography

4700-PO-94

Kenji Toyoda¹, Kensuke Uchida¹, Shinsuke Haze¹, Shinji Urabe¹

1. *Osaka University, Japan*

Realization of Robust Single-Qubit Operations with Purely Geometric Phase Factors

Single-qubit operations in a single trapped ion are performed by means of purely geometrical phase factors. Multiple dark states in a tripod system are manipulated adiabatically to perform the gate operations.

4700-PO-95

R.N. Stevenson¹, J.J. Hope¹, A.R.R. Carvalho¹

1. *Department of Quantum Sciences, Research School of Physics and Engineering, The Australian National University, Australia*

Engineering Steady States Using Jump-Based Feedback for Multipartite Entanglement Generation

We investigate using quantum-jump-based feedback to manipulate the stability of multipartite entangled states in an open quantum system. We use quantum trajectory methods to show a general strategy to isolate entangled states.

4700-PO-96

Andrew Ringsmuth^{1,2}, Tom Stace², Gerard Milburn²

1. *Institute for Molecular Bioscience, The University of Queensland, Australia*
2. *Centre for Engineered Quantum Systems, The University of Queensland, Australia*

Insights Into Long-Range, High-Temperature Quantum Coherence in Quantum Dot Networks from Photosynthesis

Through a renormalisation analysis, we suggest the possibility of sustained, long-range, high-temperature quantum coherence in a chromophore or quantum dot exciton transport network, with implications for quantum information systems in condensed matter.

4700-PO-97

M. S. Palsson¹, B.L. Higgins^{1,2}, G.Y. Xiang^{1,3}, G.J. Pryde¹

1. *Centre for Quantum Computation and Communication Technology, Centre for Quantum Dynamics, Griffith University, Australia*
2. *Institute for Quantum Computing, University of Waterloo, Canada*
3. *Key Laboratory of Quantum Information, University of Science and Technology of China, China*

Violation of Bell's Inequality via Weak Values

We used experimental weak measurement with post-selection to simultaneously gain information about non-commuting measurements on a maximally entangled state, demonstrating CHSH inequality violation of 40 and measuring 'unrealistic' joint probabilities of 1.172 ± 0.008 and -0.171 ± 0.002 . This result is consistent with a description of nature that is local but unreal.

Precision Measurements and Fundamental Tests

4700-PO-98

Evgeny Kovalchuk¹, Klaus Döringshoff¹, Katharina Möhle¹, Moritz Nagel¹, Matthias Reggentin¹, Achim Peters¹

1. *Humboldt-University, Germany*

Towards a New Generation of Ultra-Stable Molecular Optical Frequency Standards

We present different versions of an iodine stabilized Nd:YAG laser with a frequency stability of $5 \cdot 10^{-15}$ between 100 and 1000 s. Current work towards a compact setup and further improvements will be discussed.

4700-PO-99

Achim Peters¹, Moritz Nagel¹, Katharina Möhle¹, Klaus Döringshoff¹, Evgeny V. Kovalchuk¹

Humboldt-Universität zu Berlin, Institut für Physik, Germany

Ultra-Stable Cryogenic Optical Sapphire Resonators for Tests of Fundamental Physics

We present a design for an ultra-stable cryogenically cooled sapphire optical cavity system, with fractional frequency stability better than 10^{-16} at one second integration. We plan to use the ultra-stable cavities to perform a test of the isotropy of light propagation at the 10^{-20} level.

4700-PO-100

D.M. Kane¹, R.J. Chater², D.S. McPhail²

1. *Department of Physics and Astronomy, Macquarie University, Australia*
2. *Department of Materials, Imperial College London, UK*

Imperfections in Micro-optics Characterised Using Focussed Ion Beam Sectioning and Imaging

Focussed ion beam milling, combined with secondary ion and secondary electron imaging, is used to evaluate internal imperfections in glass microspheres. Flaws on the nano-scale and micro-scale are exposed. Glass aging can also be characterised.

ACOFT Presentation

Fundamentals of Nonlinear Optics

4700-PO-101

Ting-Wei Chen¹, Szu-Cheng Cheng², Wen-Feng Hsieh³

1. *Institute of Electro-Optical Science and Engineering, NCKU, Taiwan*
2. *Department of Physics, Chinese Culture University, Taiwan*
3. *Department of Photonics and Institute of Electro-Optical Engineering, NCTU, Taiwan*

Bogoliubov Excitations of Inhomogeneous Polariton Condensates

We obtain steady-state density and velocity profiles of polariton condensate in a trapped non-equilibrium system. Through small excitations, the oscillatory, instability stable, and dynamical instability modes are indicated in diagram of pump spot and strength.

4700-PO-102

Junichi Hamazaki¹, Shigeo Nagano¹, Norihiko Sekine¹, Iwao Hosako¹

1. *National Institute of Information and Communications Technology (NICT), Japan*

Blue and Green Cooperative Luminescence of Highly Yb-doped Optical Fiber

Blue luminescence emitted from ytterbium-doped fiber under infrared excitation was observed, along with well-known green cooperated luminescence. We suggest blue luminescence is due to higher-order cooperated luminescence related three excited ytterbium ions.

4700-PO-103

Li-Shu Lee¹, Tai-Huei Wei²

1. *Department of Physics, National Chung Cheng University, Taiwan*
2. *Department of Physics, National Chung Cheng University, Taiwan*

Study of Soret Effect and Convection in an Organic Solution

We verify that solute migration induced by CW laser light is quasistatic and that by 19 ps pulses is nonquasistatic. We explain the difference by light width relative to the local thermal equilibrium time.

Joint IQEC/CLEO Pacific Rim

Nanophotonics

4700-PO-104

Nikita Korolev V.¹, Sergey Starodubtcev S.¹, Peter Meleshenko A.¹, Alexander Klinskikh F.¹

1. Voronezh State University, Russia

On the Theory of Exciton States Polarizability in Open Spherical Quantum Dot

We analyze theoretically the polarizability features in exciton's regime for an open spherical quantum dot. Based on the polarizability features the method of self-consistent calculation of the dielectric constant for nanoparticles array is proposed.

4700-PO-105

Cheng-Wen Huang¹, Chin-Yi Liu², Ren-Jye Shiue³, Wei-Hua Wang³, Juen-Kai Wang^{3, 4}, Hsiang-Chen Chui¹

1. Inst. Eleo-Opt Sci and Eng, National Cheng Kung University, Taiwan
2. Department of Electro-Optical Engineering, National Cheng Kung University, Taiwan
3. Institute of Atomic and Molecular Sciences, Taiwan
4. Center for Condensed Matter Sciences, National Taiwan University, Taiwan

Scrutinizing Graphene with Polarized Raman Spectroscopy

The authors report polarized Raman measurement of single-layer graphene. The G peak position shows polarization dependence, because of the stress on the sample. The relation between the local stress and the polarization will be discussed.

4700-PO-106

Ivan Sinev^{1,2}, Anton Samusev^{1,2}, Kirill Samusev^{1,2}, Natali Grigoryeva³, Aleksandr Mistonov³, Sergei Grigoriev⁴, Dmytro Byelov⁴, Andrei Petoukhov⁵

1. Research University of Information Technologies, Mechanics and Optics, Russia
2. Ioffe Physical Technical Institute, Russia
3. Faculty of Physics, St. Petersburg State University, Russia
4. Petersburg Nuclear Physics Institute, Russia
5. Debye Institute for Nanomaterials Science, The Netherlands

Optical and Microradian X-ray Diffraction from Opal-like Films: Transition from 2D to 3D Regimes

During microradian x-ray diffraction experiments we obtained unprecedented angular resolution, which is crucial to characterize the large scale structures ordered on the large distances (100 lattice periods). The unique approach to the optical diffraction experiments allowed us to distinguish 2D and 3D diffraction regimes. In addition, using immersion spectroscopy method we concluded the possibility of the selective control over the intensity of Bragg diffraction reflexes in low-contrast multi-component photonic crystals.

4700-PO-107

Soan Kim¹, Chul-Sik Kee¹, Bok Hyeon Kim¹, Chung Ghiu Lee²

1. Advanced Photonics Research Institute, Gwangju Institute of Science and Technology Korea
2. Department of Electronics Engineering, Chosun University Korea

The Influence of an Elliptical Center Defect on the Polarization Properties of Elliptical Air Hole Photonic Crystal Fibers

High birefringence induced by an elliptical center defect for elliptical air hole photonic crystal fiber (EPCF) is analyzed numerically using plane wave expansion method. We compared the triangular lattice EPCF (TL-EPCF) and the square lattice EPCF (SL-EPCF) with same size center defect hole. It is shown that high birefringence in the order of 10-2 is achievable by using the elliptical center defect for the SL-EPCF.

4700-PO-108

Amir Djalalian-Assl¹, Xiao Ming Goh¹, Ann Roberts¹, Tim J. Davis²

1. School of Physics, The University of Melbourne, Australia
2. CSIRO Material Science & Engineering, Australia

Optical Nano-antennas

Optical nano-antennas are nano-scaled metallic devices capable of manipulating and controlling visible light at sub-wavelength scales. Here we discuss the development of novel nanometric slot antennas and their complementary nanoparticle antennas.

ACOFI Presentation

4700-PO-109

Dougal Kan¹, Lindsay Botten¹, Chris Poulton¹, Ara Asatryan¹, Kokou Dossou¹

1. School of Mathematical Sciences, University of Technology, Australia

Semi-analytical Formulations for the Surface Modes of Photonic Woodpiles

We describe semi-analytical methods for modeling the optical surface modes of finite and semi-infinite photonic woodpiles, and describe the various coupling regimes that arise when the structure is finite. We also consider the surface modes that result when two woodpiles are used to create a Fabry-Pérot cavity.

4700-PO-110

Dae Jung Yu¹, Kihong Kim¹

1. Division of Energy Systems Research, Ajou University, Korea

Giant Amplification of Electromagnetic Waves due to Inverse Mode Conversion in a Transition Layer of Metamaterials

We study theoretically the giant amplification effect of electromagnetic waves in a transition layer of metamaterials with gain, which occurs due to inverse mode conversion phenomena.

ACOFI Presentation

4700-PO-111

Henrique Baltar¹, Krystyna Drozdowicz-Tomsia¹, Ewa Goldys¹

1. Department of Physics and Astronomy, Macquarie University, Australia

Tuning Resonant Modes in a Plasmonic Array of Nanocylinders by a Mirror

In order to advance in the development of nanodevices, we simulated silver nanocylinders arrays over mirrors and compared with experimental data. They match and we can tune resonant modes by modifying environmental and geometric properties.

4700-PO-112

Judith Dawes^{1,2}, Matthias Brendle^{1,2}, Michaela Micko^{1,2}, Markus Pasch^{1,2}, Eric Magi^{1,3}

1. ARC Centre of Excellence CUDOS, Australia
2. MQPhotonics Macquarie University, Australia
3. School of Physics, University of Sydney, Australia

Functionalising Opals: Versatile Self-assembled Photonic Crystal Devices

Opals offer a practical way to realize 3D bandgap functional materials. We have fabricated and optically characterized opals incorporating optical fibre tapers. Opals assembled from silver coated microspheres exhibit enhanced the refractive index contrast and bandgap effects.

4700-PO-113

Alexander Minovich¹

1. Nonlinear Physics Centre, Centre for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS), Research School of Physics and Engineering, Australian National University, Australia

Two Methods to Achieve the Tunability of Optical Fishnet Metamaterials

We propose two ways of tuning of the optical properties of a fishnet metamaterial infiltrated by liquid crystal. The first method is to control the hole mode of the structure and the second method is realised via the tuning of surface-plasmon polariton modes. We show that the last allows for more than 300 times refractive index enhancement.

4700-PO-114

Hsiang-Chen Chui¹, Chen-Han Huang^{1,2}, Hsing-Ying Lin^{1,2}, Shih-tse Chen², Chih-Yi Liu³, Yonhua Tzeng², Chien-Hsiang Fan¹

1. Inst of Electro-Optical Science and Engineering, National Cheng Kung University, Taiwan
2. Institute of Microelectronics, National Cheng Kung University, Taiwan
3. Department of Electro-Optical Engineering, National Cheng Kung University, Taiwan

Optical Characteristics of Porous Anodic Aluminium Oxide Films with Varied Pore Sizes with Embedded Silver Nanoparticles

The dielectric porous anodic aluminum oxide films with embedded silver nanoparticles arrays have photo-induced plasmon-coupling and can be applied to photo-absorption sensors. We systematically change the pore diameter and inter-pore spacing to investigate their influence.

4700-PO-115

Takuya Iida^{1,2}

1. Nanoscience and Nanotechnology Research Center, Osaka Prefecture University, Japan
2. PRESTO, Japan Science and Technology Agency, Japan

Theory of structure control of nanocomposites by multiple laser beams and thermal fluctuations

I theoretically investigate the possibility of configuration control of metallic nanocomposites by light-induced force with multiple Gaussian beams. It has been clarified that we can control their structural transition with the help of thermal fluctuations.

4700-PO-116

D.K. Gramotnev^{1,2}, S.J. Tan³, S.I. Bozhevolnyi¹

1. Institute for Technology and Innovation, University of Southern Denmark, Denmark
2. Nanophotonics Pty Ltd, Australia
3. Applied Optics and Nanotechnology Program, Faculty of Science and Technology, Queensland University of Technology, Australia

A New Type of Gap Plasmon Waveguides for Integrated Nano-Optics

Gap plasmon waveguides with dielectric and metal layers and 2D localization are proposed and analyzed for integrated nanophotonics applications. Advantages of these waveguides for the design of highly integrated plasmonic interconnects and components are discussed.

4700-PO-117

Jia-Han Li¹, Shih-Wen Chen¹, Yu-Sheng Wang¹, Yung-Ming Yeh¹

1. National Taiwan University, Taiwan

Effect of Nanoparticle Distribution on Light Transmission through the Silicon Substrate

We study the light transmissions for periodic and non-periodic arrangements of the nanoparticle distributions atop the silicon substrate by finite-difference time-domain method. Our results give the guidelines of the nanoparticle distribution for better light transmission.

Ultrafast Optics and Photonics

4700-PO-118

D.Y. Tang¹, C.W. Xu¹, W.D. Tan¹, J.Zhang¹, R.J. Knize²

1. School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore
2. Department of Physics, United States Air Force Academy, USA

Dark Pulse Emission from a 780nm Diode Laser with External Cavity Feedback

Dark pulse emission from a 780nm diode laser was observed. The laser consists of a simple laser diode module and a planar mirror. The obtained maximum output power for dark pulse operation is 97mW. But the duration and darkness of the pulses, as well as the formation mechanism need to be confirmed.

4700-PO-119

Matthew Petrasianus¹, Andreas Jechow¹, John Canning², Michael Stevenson², Paul Westbrook³, Kenneth Feder³, David Kielpinski¹

1. Centre for Quantum Dynamics, Griffith University, Australia
2. Interdisciplinary Photonics Laboratories (iPL), University of Sydney, Australia
3. OFS Laboratories, USA

A High-power Ultrafast Laser Source with 300 MHz Repetition Rate for Trapped-ion Quantum Logic

We implement a mode-locked UV laser source at 300 MHz repetition rate for use in fast quantum logic gates with trapped ions. The architecture allows scaling of repetition rate into the GHz range.

4700-PO-120

Mitsuru Kuzuwata¹, Toshiaki Yamazaki¹, Hiroshi Ono¹, Tatsutoshi Shioda¹

1. Nagaoka University of Technology, Japan

Spectral Waveform Measurement of 500 GHz pulse by Dual Heterodyne Mixing Method

A novel holographic analyzer to measure phase and amplitude spectra has been proposed named as Dual Heterodyne Mixing Method. As a demonstration, 500 GHz band optical frequency comb was measured successfully.

Ultrafast Laser Science

4700-PO-121

Hiro Yoshi Kozai¹, Yuusuke Hirotsawa¹, Hayato Mitagawa¹, Noriaki Turumati¹, Shyun Kosiba¹, Mitsuru Ishikawa², Syunsuke Nakanishi¹, Vasudevan Pillai Biju²

1. Department of Advanced Materials Science, Kagawa University, Japan
2. AIST Shikoku, National Institute of Advanced Industrial Science and Technology, Japan

Effect of solvents on optical coherence properties of CdSe/ZnS quantum dots in solution detected by femtosecond four-wave mixing

We report novel effect of solvents on optical coherence properties of CdSe/ZnS semiconductor quantum dots (QDs) in solution detected by femtosecond four-wave mixing (FWM) spectroscopy.
ACOFI Presentation

4700-PO-122

Xiaonong Zhu¹, Nan Zhang¹, Zehua Wu¹, Kuanhong Xu¹

1. Institute of Modern Optics, Nankai University; Key Laboratory of Opto-electronic, China

Investigation of Air Plasma Produced by Double Femtosecond Laser Pulses

Physical mechanisms of multiple fluorescence regions and strong scattered light observed in the fluorescence images of the micro air plasma generated by double femtosecond laser pulses are investigated using time-resolved shadowgraphic method.

4700-PO-123

William Wallace^{1,2}, Michael Pullen^{1,2}, Dane Laban^{1,2}, Adam Palmer^{1,2}, Friedrich Hanne³, Klaus Bartschat⁴, Alexei Grum-Grzhimailo^{4,5}, Daniel Weflen⁴, Brant Abeln⁴, Igor Ivanov⁶

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3. Atomic and Electronics Physics Group, Westfälische Wilhelms-Universität, Münster, Germany
4. Department of Physics and Astronomy, Drake University, Des Moines, USA
5. Institute of Nuclear Physics, Moscow State University, Russia
6. Research School of Physical Sciences, The Australian National University, Australia
7. ARC Centre of Excellence for Coherent X-Ray Science, University of Melbourne, Australia

Above-threshold Ionization In Atomic Hydrogen Using Intense Few-cycle Laser Pulses

We have performed the first strong-field ionization experiment in atomic hydrogen using few-cycle laser pulses. Quantitative agreement between experimental data and advanced ab initio simulations has been achieved at the 10% level.