ADVANCE PROGRAM

12th International Conference on Optics-photonics Design & Fabrication

"ODF '20 in 2021, Taoyuan"

June 1-3, 2021

National Central University, Taoyuan, Taiwan

"Due to the worldwide coronavirus pandemic, ODF'20 in 2021 will be held in hybrid format, a combination of on-site and virtual presentations."

Organized by

NCU (National Central University / Taiwan)

ODG (Optics Design Group of The Optical Society of Japan / Japan)

Co-Sponsored by

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MOST (Ministry of Science and Technology / Taiwan)

PIDA (Photonics Industry & Technology Development Association / Taiwan)

TPS (Taiwan Photonics Society / Taiwan)

In Cooperation with

Applied Optics Meeting in Kansai ・CIE (Chinese Institute of Engineers) ・DGaO (German Society of Applied Optics) ・EOS (European Optical Society) ・ICO (International Commission for Optics) ・IEICE (The Institute of Electronics, Information and Communication Engineers) ・IEIJ (The Illuminating Engineering Institute of Japan) ・JIEP (Japan Institute of Electronics Packaging) ・IIEEJ (The Institute of Image Electronics Engineers of Japan) ・ITE (The Institute of Image Information and Television Engineers) ・JOEM (Japan Optomechatronics Association) ・JOMA (Japan Optical Measuring Instruments Manufacturer's Association) ・JPS (The Physical Society of Japan) ・JSMBE (Japanese Society for Medical and Biological Engineering) ・Japan Photonics Council ・JSPE (The Japan Society for Precision Engineering) ・LSJ (The Laser Society of Japan) ・OITDA (Optoelectronics Industry and Technology Development Association) ・OPSS (Optics and Photonics Society of Singapore) ・OSA (The Optical Society) ・OSK (Optical Society of Korea) ・ROS (Rozhdestvensky Optical Society) ・SPIE (The International Society for Optics and Photonics) ・SPIJ (The Society of Photography and Imaging of Japan) ・The 179th Committee on Photonics Information Systems, JSPS (Japan Society for the Promotion of Science) ・The Color Science Association of Japan ・The Astronomical Society of Japan ・The Spectroscopical Society of Japan ・SID Japan Chapter (Society for Information Display Japan Chapter) ・TOOMA (Taiwan Optics/Optronics Manufacturers' Association) ・TPS (The Physical Society of Taiwan)

Post-Deadline Paper Submission : April 06, 2021

http://www.odf20.tw

TIME TABLE

1st Day		2nd Day	
June 1, 2021 (Tuesday)		June 2, 2021 (Wednesday)	
08:10	Registration	08:10	Registration
08:50	Opening Remark	08:50	Optical Components / Devices (2)
09:00	Plenary Session		
10:15	Coffee Break	10:25	Coffee Break
10:30	Optical Design / Simulation / Fabrication (1)	10:40	Optical Systems (2)
12:05	Lunch	12:15	Lunch
13:25	Optical Systems (1)	13:30	Optical Design / Simulation / Fabrication (2)
14:45	Group Photo / Coffee Break	15:05	Coffee Break
15:05	Optical Components / Devices (1)	15:20	New Technologies (2)
16:25	Coffee Break		
16:40	New Technologies (1)	16:55	Poster Session (1)
18:20 20:30	Welcome Reception (SHUI YUE MANOR)	18:20	

3rd Day	
June 3, 2021 (Thursday)	
08:10	Registration
09:00	Special Session "AR/VR/MR Optics" Opening Remark
09:10	Special Session "AR/VR/MR Optics" (1)
10:25	Coffee Break
10:40	Special Session "AR/VR/MR Optics" (2)
11:30	Lunch
13:00	Optical Design / Simulation / Fabrication (3)
14:15	Coffee Break
14:30	Optical Systems (3)
15:45	Closing Ceremony / Award
16:15 17:40	Poster Session (2)

INTRODUCTION

SCOPE OF THE CONFERENCE

ODF'20 in 2021 is an international forum for the engineers and scientists in the field of Optics-photonics Design and Fabrication to exchange their ideas and achievements with the goal of future mutual progress. The conference covers the following major topical categories:

Category 1. Optical Design/Simulation/Fabrication

Lens Design, Illumination Simulation, Non-imaging Optics Design, Lens Design Theory, Freeform Optics, Simulation Software, Fabrication and Testing

Category 2. Optical Components/Devices

Laser, LED, OLED, Detector, DOE/HOE, Thin Film, Optical Waveguide, Optical Fiber, Integrated Optoelectronic Device, Active Optical Component, Optical MEMS, Photonic Crystal

Category 3. Optical Systems

Camera, Microscopy, Display, Projector, Optical Data Storage, Optical Lithography, Illumination Optics, VR/AR, Automotive Optics, LiDAR, Biomedical Optics, Optofluidics, Optical Measurement, Optical Sensing

Category 4. New Technologies

AI Optics, Computational Imaging and Sensing, Digital Holography, CGH, Nonlinear Optics, Ultrafast Optics, Metamaterial, Plasmonics, Near-Field Optics, Quantum Optics, Nano Structures, Optical Cloaking, Other Future Technologies in Optical Design and Fabrication

Special Session: "AR/VR/MR Optics"

TECHNICAL PROGRAM

June 1, 2021 (Tuesday)

Opening Session (8:50-9:00)

Presider:

H. Tatsuno (Ricoh / Japan)

Opening Remark

C. C. Sun (National Central Univ. / Taiwan)

Plenary Session (9:00-10:15)

Presiders:

Y. H. Chen (National Central Univ. / Taiwan)
J. Tanida (Osaka Univ. / Japan)

01PL-01 (Invited)

09:00 Optical Meta Device: Fabrication and Application

D. P. Tsai (The Hong Kong Polytechnic Univ. / Hong Kong)

Optical meta-devices using meta-surfaces which composed of artificial nanostructures are able to manipulate the electromagnetic phase and amplitude at will. The design, fabrication and application of the novel optical meta-devices are reported in this talk.

01PL-02 (Invited)

09:25 Paradigm shifts in design and fabrication of optical systems - new opportunities of additive manufacturing for photonics

T. S. Tkaczyk (Rice Univ. / USA)

Additive technologies enable geometries/design strategies not possible with more traditional methods. This presentation provides summary of the state of the art of 3D printing for photonics along with fabrication examples and applications

01PL-03 (Invited)

09:50 Twisted light : Fundamentals and Applications

T. Omatsu (Chiba Univ. / Japan)

'Twisted light' with orbital angular momentum twists various materials, thereby yielding various helical structures. Such twisted light offers not only unique structures but also entirely novel phenomena for advanced photonics devices and optical technologies

Coffee Break (10:15-10:30)

Optical Design / Simulation / Fabrication (1)

(10:30-12:05)

Presiders:

Y. C. Fang (National Kaohsiung Univ. of Science and Technology / Taiwan)

T. Otaki (Nikon / Japan)

01S1-01 (Invited)

10:30 Designing Optical Relays

J. Sasian (Univ. of Arizona / USA)

This presentation discusses the design of optical relay lenses often used in optical engineering. In particular the design of a doubly telecentric relay for machine vision will be discussed in detail.

01S1-02 (Invited)

10:55 Deep Learning in Optical Design and Metrology

R. G. Liang (Univ. of Arizona / USA)

(To Be Determined)

01S1-03

11:20 Miniature Lens Decentration Measurement by High Dynamic Range Shack-Hartmann Wavefront Sensor

Y. D. Su and C. W. Liang (National Central Univ. / Taiwan)

A novel HDR-SHWFS is utilized to measure the decentration aberration of miniature lens. Depending on lens shape factor, the measurement quantified in terms of two surface decentration achieving record of measuerment repeatability about 0.02-0.05 um.

01S1-04

11:35 Relationship Between Detector Accuracy and Measurement Quality in Super-resolution Complex Amplitude Measurements Using Virtual Phase Conjugation

R. Imai, A. Okamoto, S. Kawashima, K. Ogawa, and A. Tomita (Hokkaido Univ. / Japan)

We investigate the accuracy requirements for a detector using a super-resolution complex amplitude measurement technique with virtual phase conjugation. The results of numerical analysis show that the proposed technique can be used for conventional detectors.

01S1-05

11:50 Shack-Hartmann Wavefront Sensor with Improved Dynamic Range

W. C. Chen, L. Y. Lin, and C. W. Liang (National Central Univ. / Taiwan)

We improved the dynamic range of Shack-Hartman wavefront sensor in both spatial and intensity domains. The experimental results are compared with the ray tracing simulation showing a promising result for application in aspherical wavefront testing.

Lunch (12:05-13:25)

Optical Systems (1) (13:25-14:45)

Presiders:

C. H. Chen (National Chiao Tung Univ. / Taiwan)
K. Tajima (Hitachi / Japan)

01S3-01 (Invited)

13:25 Integrating holographic and geometrical imaging for display optical system design

C. H. Chen (National Chiao Tung Univ. / Taiwan), P. S. Chiu (National Tsing Hua Univ. / Taiwan), W. T. Lin, and C. T. Mu (National Chiao Tung Univ. / Taiwan)

The function of image display system becomes more demanding and complicated which requests to exploit both holographic and geometrical approach to resolve. HUD and floating image display system are used as the examples for illustration.

01S3-02 (Invited)

13:50 Lens developments at Zeiss for Apollo moon landing missions 50 years ago

V. Blahnik (Carl Zeiss / Germany)

We present the development process and the optical designs of Carl Zeiss camera lenses for NASA space missions. This 1960s era paved the way for computer-based optical design methodology and new products at Zeiss.

01S3-03

14:15 Three-dimensional measurement method with one-shot color mapping of light direction extracted from surface BRDF

H. Ohno (Toshiba Corp. / Japan)

One-shot color mapping imaging system of light direction extracted surface BRDF (bidirectional reflectance distribution function) is demonstrated to measure a three-dimensional surface of a material.

01S3-04

14:30 Multi-Person Authentication Using an Ultrafast Pan-Tilt Camera

L. H. Shen, S. P. Hu, K. Shimasaki, and I. Ishii (Hiroshima Univ. / Japan)

We develop a multi-person authentication system operating as multiple virtual cameras for face authentication by synchronizing an high frame rate camera and a galvanomirror at hundreds of fps and demonstrate its effectiveness for people tracking.

Coffee Break / Group Photo (14:45-15:05)

Optical Components / Devices (1) (15:05-16:25)

Presiders:

A. Seifert (CIC nanoGUNE / Spain)
K. Y. Lai (National Central Univ. / Taiwan)

01S2-01 (Invited)

15:05 Novel Transmission Gratings for Astronomical Observation

N. Ebizuka, T. Okamoto, Y. Yamagata (RIKEN / Japan), M. Sasaki (Toyota Technological Inst. / Japan), I. Tanaka, T. Hattori (NAOJ / Japan), Y. Nakauchi (Inst. of Space and Astronautical Science / Japan), M. Nishimaki, K. Yamamoto (Nalux / Japan), and K. Saiki (Osaka Univ. / Japan)

We are developing transmission gratings for next generation instruments for the 8.2m Subaru Telescope, TMT and other telescopes. We describe the simulation results, fabrication methods, and experimental results of these transmission gratings in this article.

01S2-02 (Invited)

15:30 Laser and Superluminescent Diodes for Lighting and Visible Light Communication

M. W. Kong, Jorge A. Holgun-Lerma, Abdullah A. Alatawi, C. H. Kang, T. K. Ng, and B. S. Ooi (King Abdullah Univ. of Science and Technology / Saudi Arabia)

Laser and superluminescent diodes are important components for simultaneous solid-state lighting and multi-gigabit-per-second visible light communication. We will discuss the current progress in view of the emerging fifth-generation networks and beyond.

01S2-03

15:55 Meta-lens Array for High Dimensional Quantum Entanglement Light Source

M. K. Chen (Hong Kong Polytechnic Univ. / Hong Kong, National Taiwan Univ. / Taiwan, Academia Sinica / Taiwan), L. Li (Hong Kong Polytechnic Univ. / Hong Kong), Z. X. Liu (Nanjing Univ. / China), X. F. Ren (Univ. of Science and Technology of China / China), S. M. Wang (Nanjing Univ. / China), V. C. Su (Natonal United Univ. / Taiwan), C. H. Chu (Academia Sinica / Taiwan), H. Y. Kuo (National Taiwan Univ. / Taiwan), W. B. Zang (Nanjing Univ. / China), G. C. Guo (Univ. of Science and Technology of China / China), L. J. Zhang (Nanjing Univ. / China), Z. L. Wang, S. N. Zhu (Univ. of Science and Technology of China / China), and D. P. Tsai (Hong Kong Polytechnic Univ. / Hong Kong, National Taiwan Univ. / Taiwan, Academia Sinica / Taiwan)

We demonstrate meta-lens has great potential in quantum-optical technologies due to the excellent flexibility in light-field manipulation. By integrating a metalens array with a nonlinear crystal, we demonstrate a 100-path spontaneous parametric down-conversion photon-pair source.

01S2-04

16:10 Near Infrared Photodetector for Growing High Quality Germanium Film by RF Magnetron Sputtering and High Temperature Thermal Annealing

G. S. Zeng, S. W. Chen, and S. H. Chen (National Central Univ. / Taiwan)

We use radio frequency magnetron sputtering to deposit germanium films. The defects of the substrate and the thin film are reduced through annealing. Finally, graphene was used as an electrode to make a near-infrared photodetector.

Coffee Break (16:25-16:40)

New Technologies (1) (16:40-18:00)

Presiders:

T. F. Guo (National Cheng Kung Univ. / Taiwan)
T. Nomura (Wakayama Univ. / Japan)

01S4-01 (Invited)

16:40 Single-shot incoherent holography with multiplexed gratings for 3D imaging

T. Nobukawa (NHK / Japan)

Our proposed single-shot incoherent holography can simultaneously capture four self-reference holograms and reconstruct 3D images through a phase-shifting method and diffractive calculation. The effectiveness of our proposed method was experimentally verified.

01S4-02 (Invited)

17:05 Intensifying MoS2 Bilayers by Quadrupole Gap Plasmons for Excellent Hydrogen Evolution Reaction and by Morphology-controlled Plasmonic Nanostructures towards Superior Photodetectors

T. J. Yen (National Tsing Hua Univ. / Taiwan)

Here I will present two methods to maximize light-matter interactions between bilayer molybdenum disulfide and the nanoscale plasmonic structures (tailored nano-antennas and morphology-controlled plasmonic nanoparticles), for boosting their hydrogen evolution reaction and photodetection applications.

01S4-03

17:30 Construction of fluorescence tags using energy transfer networks on self-assembled DNA

Y. Ogura, J. Inoue, T. Nishimura, and J. Tanida (Osaka Univ. / Taiwan)

We apply energy transfer networks consisting of fluorescence molecules on DNA to construction of fluorescence tags. Experimental results show that diverse spectral responses are obtained for different configurations of tags with the same composition.

01S4-04

17:45 Quantum-Classical Spectral Mapping of a Type-II Phase-Matched Photon-Pair Waveguide Source

H. P. Chung (National Central Univ. / Taiwan), P. Kumar (Friedrich-Schiller-Univ. Jena / Germany), Y. T. Li (National Central Univ. / Taiwan), K. Wang (The Australian National Univ. / Australia), O. Bernand, C. Shirpurkar (Friedrich-Schiller-Univ. Jena / Germany), W. C. Su (National Central Univ. / Taiwan), T. Pertsch (Friedrich-Schiller-Univ. Jena / Germany), Andrey A. Sukhorukov (The Australian National Univ. / Australia), F. Setzpfandt (Friedrich-Schiller-Univ. Jena / Germany), and Y. H. C(National Central Univ. / Taiwan)

We demonstrate the spectral properties of type-II photon-pair sources can be determined using the quantum-classical correspondence through the classical sum-frequency-generation measurements. Fast monitor/control of the quantum state of photon-pair sources is possible with this technique.

Welcome Reception (18:20-20:30) (SHUI YUE MANOR)

June 2, 2021 (Wednesday)

Optical Components / Devices (2) (08:50-10:25)

Presiders:

C. K. Hwangbo (Inha Univ. / Korea)
R. H. Horng (National Chiao Tung Univ. / Taiwan)

02S2-05 (Invited)

08:50 Active Optics for Dynamic Focus, Aberration Management and Beam Scanning

D. L. Dickensheets (Montana State Univ. / USA)
(To Be Determined)

02S2-06 (Invited)

09:15 Finding Holes in Wide Bandgap Semiconductors

D. Barlage (Univ. of Alberta / Canada)
Creating high performance electronic devices in wide bandgap semiconductors is limited by the ability to have regions of high concentrations of holes. This presentation explores how inversion layers can be used to address this challenge.

02S2-07

09:40 Surface modification by plasma polymerization interlayer for adhesion promotion between PMMA and optical thin film

K. W. Lu and C. C. Kuo (National Central Univ. / Taiwan)
Plasma polymerization thin film composed of aminosilane deposited by a low-pressure system with DC power was applied to improve the adhesion between poly(methyl methacrylate) substrate and the optical thin film.

02S2-08

09:55 Polarization diffractive optical elements fabricated by using optically biaxial polymer liquid crystal

R. Momosaki, K. Ashikawa, M. Sakamoto, K. Noda, T. Sasaki (Nagaoka Univ. of Technology / Japan), T. Sakai, Y. Hattori (Hayashi Telempu Co., Ltd. / Japan), N. Kawatsuki (Univ. of Hyogo / Japan), and H. Ono (Nagaoka Univ. of Technology / Japan)

We developed polarization diffractive optical elements (PDOEs) using optically biaxial polymer liquid crystal and investigated their diffraction properties. As a results, the PDOE in Raman-Nath regime shows a low dependence on oblique incidences.

02S2-09

10:10 Fabrication and characterization of Graphene-based Flexible Electrochromic Devices

V. M. Gospodinova (National Chiao Tung Univ. / Taiwan, IOMT / Bulgaria), S. H. Wang, S. H. Lin, and K. Y. Hsu (National Chiao Tung Univ. / Taiwan)

Fabrication and characterization of flexible electrochromic devices in ionic electrolyte layer sandwiched between multilayer graphene on PET substrates is reported. The electro-optical modulation show great potentials of graphene for the next-generation flexible electrochromic devices.

Coffee Break (10:25-10:40)

Optical Systems (2) (10:40-12:15)

Presiders:

F. Z. Chen (Taiwan Instrument Research Inst. / Taiwan, NARL / Taiwan)
H. Ohno (Toshiba / Japan)

02S3-05 (Invited)

10:40 Lidar and AR displays by MEMS-based angular and spacial light modulation

Y. Takashima (Univ. of Arizona / USA)

High-speed, monolithic and MEMS-based lidar and a large pixel count micro display device for AR display optics leverages a Digital Micromirror Device with a pulsed illumination that simultaneous modulates light in space and angular domain.

02S3-06 (Invited)

11:05 Lensless 3D sensing technology with light-field imaging using Fresnel zone aperture

Y. Nakamura (Hitachi, Ltd. / Japan)

We found that an imaginary part of the reconstructed image indicates zero at the in-focus position. By using this characteristic, we established a 3D-sensing algorithm which can generate depth images without light sources.

02S3-07

11:30 Thermal Image Reconstruction of LED Encapsulated in Silicone Rubber with a Computational Ghost Imaging System

Y. S. Hsu and T. Y. Chung (National Central Univ. / Taiwan)

With the proper configuration of a ghost imaging system, thermal images of a LED chip in silicone rubber encapsulation can be reconstructed by measuring the thermal radiation in the transparent spectral window of the encapsulant.

02S3-08

11:45 Analysis of learning-based phase retrieval

Y. Nishizaki (Osaka Univ. / Japan, Osaka Research Inst. of Industrial Science and Technology / Japan), R. Horisaki (Osaka Univ. / Japan, PRESTO / Japan), K. Kitaguchi, M. Saito (Osaka Research Inst. of Industrial Science and Technology / Japan), and J. Tanida (Osaka Univ. / Japan)

We analysed non-iterative phase retrieval based on machine learning compared with traditional iterative ones. Learning-based phase retrieval is promising for practical applications because of its fast calculation and noise robustness.

02S3-09

12:00 Hybrid 3D Profilometry with Extended Measurement Depth Based on Binary Code and Phase Shift

H. H. Wang and S. Y. Chen (National Central Univ. / Taiwan)

To extend the imaging depth of 3D profilometry, a system combining both the binary code and phase shift methods is introduced. A 60-cm imaging depth and a reconstruction error <0.169% within this range is achieved.

Lunch (12:15-13:30)

Optical Design / Simulation / Fabrication (2) (13:30-15:05)

Presiders:

F. Chuang (Coretronic / Taiwan)
A. Nozaki (Konica Minolta / Japan)

02S1-06 (Invited)

13:30 Freeform based Head Mounted Display with Extended Eye Box and Time-Multiplexed Light Field by MEMS Vari-focal Device

F. M. Chuang, H. H. Lo, P. Lee, and C. C. Chang (Coretronic Corp. / Taiwan)

A HMD with 40 degree field of view, 5 mm eye box, distortion corrected of virtual image with 0.31inch OLED panel and light field images being accommodated from 28 cm to 100 cm is proposed.

02S1-07 (Invited)

13:55 RICOH THETA Z1 360 degree camera with triple-folded optical system

Y. Toriumi (RICOH Co., Ltd. / JAPAN)

We have developed RICOH THETA Z1 equipped with triple-folded optical system using three prisms. This optical system provides slim body with higher image quality, such as high resolution, low parallax and small blind spot.

02S1-08

14:20 Nanostructured noble metal surfaces and multivariate analysis for enhanced plasmonic sensing

J. Etxebarria-Elezgarai, M. Mowat (CIC nanoGUNE BRTA / Spain), L. Bergamini, N. Zabala, J. Aizpurua (Univ. of Basque Country UPV-EHU / Spain, CSIC-UPV/EHU and DIPC / Spain), and A. Seifert (CIC nanoGUNE BRTA / Spain, IKERBASQUE Basque Foundation for Science / Spain)

Employing nanostructures in plasmonic devices and considering a multitude of features from the resonance curves by multivariate analysis, we double sensitivity and reduce calibration errors by 38% compared to standard plasmonic sensing in Kretschmann configuration.

02S1-09

14:35 Apposition compound-eye image scanner with three-layered aperture-array light shield plate

H. Kawano, N. Nakagawa, T. Ono, S. Takushima, T. Makita, K. Kurihara, and M. Sugano (Mitsubishi Electric Corp. / Japan)

A microlens array obtains precise images, but with some gaps, while a three-layered aperture array avoids stray light via adjacent apertures. Our prototype 200-dpi image scanner takes clear image with a 6-mm gap.

02S1-10

14:50 Periscope-type 3X to 10X Zoom Mobile Phone Design and Lens Depth Analysis

Y. L. Su and W. S. Sun (National Central Univ. / Taiwan)

Two periscope-type zoom lenses, One is 7.0 megapixel 3x zoom lens, the other one is 5.0 megapixel 3x to 10x zoom lens. The sensor is 16:9 aspect ratio and the lens depth is 4.98 mm.

Coffee Break (15:05-15:20)

New Technologies (2) (15:20-16:55)

Presiders:

J. F. Chang (National Central Univ. / Taiwan)
T. Nobukawa (Hokkaido Univ. / Japan)

02S4-05 (Invited)

15:20 Complex amplitude control technology for mode-multiplexing optical cummunication

A. Okamoto (Hokkaido Univ. / JAPAN)

(To Be Determined)

02S4-06 (Invited)

15:45 Lead Halide Perovskite Based Plasmonic Nanolasers

Y. J. Lu (Academia Sinica / Taiwan)

The presenter will present an overview of her research works on the plasmonic devices in the recent years, such as perovskited based plasmonic nanolasers. She will also discuss the current status and the challenge of the nanolasers.

02S4-07

16:10 Enhancing Single-Molecule Blinking Events on Plasmon-Enhanced Substrate Surfaces

G. Abrigo (National Central Univ. / Taiwan), C. Y. Lin (National Chiao Tung Univ. / Tainan), and F. C. Chien (National Central Univ. / Taiwan)

Single-molecule fluorescence blinking on the plasmon-enhanced substrate surfaces were investigated systematically to obtain the enhancement of the fluorescence signals and blinking number of the fluorophores and reduce the requested excitation power of single-molecule localization microscopy.

02S4-08

16:25 Magneto-Optic Surface Plasmon Resonance (MOSPR) Properties of Core-shell Fe3O4@Ag Nanoparticles

A. M. Panre and E. Suharyadi (Universitas Gadjah Mada / Indonesia)

The Magneto-optic surface plasmon resonance (MOSPR) properties of core-shell Fe3O4@Ag nanoparticles was successfully investigated. The shift of SPR angle show the non-reciprocal reflection of light and indication of magnetic field can modulate the magnetic moment.

02S4-09

16:40 A C-shape Laser Trim Pattern Optimization for Thick-film Resistors

C. H. Lin and Y. H. Chang (National Taiwan Univ. / Taiwan)

A laser trim pattern on thick-film resistors is proposed to obtain better fabrication efficiencies or electrical properties, compared with conventional L-shaped trimming. We developed numerical simulations for the C-shape trimming process to verify experimental results.

Coffee Break (in Poster Session)

Poster Session (1) (16:55-18:20)

02PS1-01

Pinhole Pattern Design of Single Photon Emission Microscope System by the Analysis of Sampling Completeness Coefficient

Y. C. Chen, C. C. Chang, and W. X. Lin (National Central Univ. / Taiwan)

The multi-pinhole pattern for the single photon emission microscope system is designed by optimizing the average sampling completeness coefficient in the field of view. Both single and double helix scan trajectories are evaluated.

02PS1-02

Speckle analysis and reduction for LCOS AR projector based on laser-diode

Y. C. Lo, C. J. Ou, S. H. Tseng, C. C. Chang, and F. M. Chuang (Coretronic Corp. / Taiwan)

A novel speckle reduction element based on MEMS is designed to reduce the speckle noise. The size is compact and easy to apply to wearable display. Speckle contrast is discussed and calculated in this paper.

02PS1-03

Analysis of Conical Refractions in Biaxial Crystals

H. W. Ku (National Central Univ. / Taiwan)

We investigate the images corresponding to specific polarizations propagating in biaxial crystals with or without material chirality. We found that the polarization distributions of the intensity patterns are different from the previous research results.

02PS1-04

Geometric Phase and Dynamic Phase Analysis for PB-Phase Metasurface

Y. C. Chen, Q. C. Zeng, C. Y. Yu, and C. M. Wang (National Central Univ. / Taiwan)

The simulation of metasurface phase shift usually using the finite difference time domain method. We use effective medium approximation theory and Jones vector to simplify simulation model. Analyse the geometric phase and dynamic phase.

02PS1-05

Prediction of longitudinal chromatic aberration for various spectral range

A. Kozhina and H. Tsyganok (ITMO Univ. / Russia)

The study describes a method for predicting longitudinal chromatic aberration for one required part of the spectrum, depending on the known value of the other part, and gives examples of the workability of the method.

02PS1-06

Lightweight Structure of Primary Mirror for Remote Sensing Instruments

W. C. Tsao (National Applied Research Laboratories / Taiwan)

The lightweight structure of mirror based on the arithmetic sequence of the radial concentric circles is presented. Comparing RMS values and modal frequency by FEA analysis, the optical surface performance is between the traditional lightweight mirrors.

02PS1-07

Intelligent robot grinding and metrology of large aperture aspherical optical mirrors

C. X. Jiang (National Chung-Shan Inst. of Science & Technology / Taiwan, Oriental Inst. of Technology / Taiwan), H. Y. Wu (National Taipei Univ. of Technology / Taiwan, National Central Univ. / Taiwan), L. J. Hsiao, Y. H. Liu (National Chung-Shan Inst. of Science & Technology / Taiwan), P. H. Huang, Y. K. Huang (National Applied Research Laboratories / Taiwan), and J. C. Hsu (Fu Jen Catholic Univ. / Taiwan)

An intelligent fabrication process for grinding marks removal of large aperture aspheric optical mirrors is developed, integrating the metrology and the fabrication process together to increase the fabrication efficiency.

02PS1-08

Deformation compensation of aspheric plastic lenses for the wide angle lens

Y. C. Cheng, W. J. Peng (National Applied Research Laboratories / Taiwan), K. Abou-El-Hossein (Nelson Mandela Univ. / South Africa), C. C. Chen, and M. F. Chen (National Applied Research Laboratories / Taiwan)

The deformation compensation of the injection moulding of wide-angle plastic lenses is presented in this study. This can, make optical plastic injection meet the requirement of the design specifications of advanced lenses.

02PS1-09

Electron beam evaporation for improving film thickness uniformity by flux mapping method

K. S. Cheng and C. L. Tien (Feng Chia Univ. / Taiwan)

Improving film thickness uniformity by flux mapping method, the simulation results are in agreement with the experiments. The relative thickness of SiO2 thin film is 0.86% by flux mapping simulation and 0.93% by measuring method.

02PS1-10

Formation of a Broadband Half Mirror and Its Application to Mirror Tunnel

N. M. Lin (*TYC Brother Industrial Co.,Ltd. / Tainan)*

In this work, a broadband half mirror with an Al film was formed by using a thermal evaporation. Furthermore, the proposed half mirror can effectively achieve a good mirror tunnel.

02PS1-11

A novel optical design of bike headlamp for K-mark based on low-cost white LEDs with separate die bonding

Y. J. LIN, H. J. Lin, C. S. Wu, X. H. Lee, C. C. Sun, S. K. Lin, Y. W. Yu, and T. H. Yang (National Central Univ. / Taiwan)

We have proposed and verified a novel optical design of low-cost white LEDs in a bike headlamp for K-mark regulation. This type of bike headlamp has the potential to reduce the cost and be environmentally friendly.

02PS1-12

Effective Focal Length Comparison from Manufacture data

H. J. Kuo, H. Y. Chou, C. Y. Huang, J. H. Wang, C. Y. Wang, and F. Z. Chen (National Applied Research Laboratories / Taiwan)

We present an autocollimator manufacture data and its EFL. Manufacture data were collected via Lens MES. Previous study shows 75.6% center thickness of lens is larger than the nominal value, which would affect EFL measurement.

02PS1-13

Modeling PQ-DMNA/PMMA Photochemical Mechanism and Manufacturing High Diffraction Efficiency VBG

Y. C. Cheng, Y. H. Hsieh, Y. C. Hsia, and *T. Y. Chung (National Central Univ. / Taiwan)*

PQ-DMNA/PMMA is a new photopolymer for red light recording. The photochemical reaction rate equation and 1D diffusion equation were combined. With a series of experiments, high diffraction efficiency reflective-type PQ-DMNA/PMMA VBG was fabricated successfully.

02PS1-14

A Study of A 8-NM Marine Light with LEDs

Y. S. Lin, X. H. Lee, Y. C. Jen, S. K. Lin (National Central Univ. / Taiwan), C. C. Sun (National Central Univ. / Taiwan, National Chiao Tung Univ. / Taiwan), C. S. Wu, Y. W. Yu, and T. H. Yang (National Central Univ. / Taiwan)

A new design of LED marine light which fit the requirement of IALA regulation is proposed. As a result, a distance of 8 nautical miles can be reached by using the proposed 6W LED luminaire.

02PS1-15

Solution-Based Casting and PQ:PMMA Film Reaction Model

Y. C. Cheng and T. Y. Chung (National Central Univ. / Taiwan)

PQ:PMMA film can be fabricated by the solution-based casting method. The PQ:PMMA film reaction mechanism has been studied. The diffraction efficiency can reach 0.04 with a film thickness of 115 μm.

02PS1-16

Rapid intelligent automatic process for manufacturing aspherical lightweight spaceborne mirrors

T. C. Hu (National Chung-Shan Inst. of Science & Technology / Taiwan, Lunghwa Univ. of Science and Technology / Taiwan), H. Y. Wu (National Taipei Univ. of Technology / Taiwan, National Central Univ. / Taiwan);L. J. Hsiao (National Chung-Shan Inst. of Science & Technology / Taiwan), Y. H. Liu (National Chung-Shan Inst. of Science & Technology / Taiwan), W. C. Chang (National Chung-Shan Inst. of Science & Technology / Taiwan), P. H. Huang , and Y. K. Huang (National Applied Research Laboratories / Taiwan)

A rapid and cost-effective intelligent grinding process has been successfully developed to minimise the need of human interventions further and increase the production efficiency of aspherical lightweight spaceborne mirrors.

02PS1-17

Fabrication of IGZO Thin Films Using High Power Impulse Magnetron Sputtering

Y. K. Lai, Y. J. Lu, and S. H. Chen (National Central Univ. / Taiwan)

Amorphous silicon is an active layer with the carrier mobility about 1 cm^2/Vs, which is too low for high-speed display applications. We have developed IGZO by using HiPIMS with carrier mobility above 10 cm^2/Vs.

02PS1-18

Ag/BCP: ZnO Nanoparticles Electron Buffer Layer for Perovskite Solar Cells

K. J. Cheng, C. J. Chen (National Central Univ. / Taiwan), S. H. Chang (Chung Yuan Christian Univ. / Taiwan), and S. H. Chen (National Central Univ. / Taiwan)

The Ag modified bathocuproine: ZnO nanoparticles (BCP:ZnO NPs) thin film was used as the electron buffer layer of the bifacial inverted-type perovskite solar cell with the power conversion efficiency increased from 8.97% to 11.26%.

02PS1-19

Preliminary Stray Light Analysis of a Three-Mirror-Anastigmat Telescope

C. F. Ho, T. M. Huang, M. W. Hung, and F. Z. Chen (National Applied Research Laboratories / Taiwan)

Preliminary stray light analysis of a three-mirror-anastigmat telescope was performed. Irradiance values on the focal plane of corresponding baffles were presented.

02PS1-20

Ultra-compact Spectrometer Based on Free-form Huygens' Metalens

C. Y. Yu, Q. C. Zeng (National Central Univ. / Taiwan), C. Y. Han (National United Univ. / Taiwan), and C. M. Wang (National Central Univ. / Taiwan)

The phase distribution of the PB-phase meta-device is the combination of an aspherical lens and blazed grating. Not only focusing and deflecting, the off-axis aberration is also eliminated.

02PS1-21

Electrically controllable linear polarization rotator using tandem triple nematic liquid crystal cells

Y. X. Liu, C. K. Liu, and K. T. Cheng (National Central Univ. / Taiwan)

This study reports an electrically controllable linear polarization rotator simulated by 1D-DIMOS software, which can be used to continuously rotate the polarization of incident linearly polarized light using tandem triple nematic liquid crystal (LC) cells.

02PS1-22

Conventional formula of the aberration coefficients for off-axial use of elliptic mirror

K. Saito (Kindai Univ. Technical College / Japan)

The conventional formula up to the third order aberration coefficients involving the paraxial analysis for an off-axial single-interface system using an elliptic mirror are described.

02PS1-23

Measurement of Retardance of Precision Imaging Optics

K. Sugisaki (Nikon Corp. / Japan)

A retardance measurement method for precision imaging optics is proposed. The retardance of the test optics is isolated from the other optics and errors due to wave plate is removed. Proposed method was verified experimentally.

02PS1-24

Wavefront coding applied to a digital optical system for the extension of the depth of field

C. F. Lee and C. C. Lee (National Central Univ. / Taiwan)

We design a camera with wavefront coding and show how a ten times extension of the depth of field can be achieved after employing a cubic optical element.

02PS1-25

Extremely Long-Distance Projection Based on White LEDs

C. S. Wu and C. C. Sun (National Central Univ. / Taiwan)

A luminaire with light weight, energy saving, and low cost by using nine optical modules to produce a projection distance of 3.1 km with driving power of 41.8 watts is verified by experiment.

02PS1-26

Subwavelength Imaging of Magnetized Plasma Photonic Crystals Slab

C. H. Lee and P. G. Luan (National Central Univ. / Taiwan)

We use the finite-difference time-domain (FDTD) method with Z transform to calculate the band structure of metallic photonic crystal under an external magnetic field and simulate the subwavelength imaging phenomena.

02PS1-27

NIR spectroscopic sensing of Atmospheric water vapor - Assisted by Machine Learning -

H. Tanaka and Y. Ohtera (Toyama Prefectural Univ. / Japan)

Atmospheric water vapour (WV) under various weathers was indirectly estimated by near infrared spectral data of the sky. We also visualized a WV map on the sky utilizing a photonic crystal-type multispectral image sensor.

02PS1-28

Evaluation of Partial Backward Lighting Lens Designed for LED Traffic Signs of Dot Matrix Type

Y. C. Chen, J. H. Fang (National Central Univ. / Taiwan), L. Lee (National Central Univ. / Taiwan, Univ. of Arizona / USA), Z. W. Zhang, and C. C. Wu (National Central Univ. / Taiwan)

This study concerns LED highway traffic signs of dot matrix type. A custom-made traffic sign with and without the partial backward lighting lens is evaluated in three aspects, including the legibility, visual comfort and preferences.

02PS1-29

Analysis of self-weight deformation and random vibration response for an optomechanical structure

Y. C. Lin (Taiwan Instrument Research Inst. / Taiwan)

A straightforward approach for the optomechanical analysis by use of finite element method with Zernike polynomials is proposed. This strategy will save time on the testing of optomechanical structures in the preliminary design phase.

02PS1-30

Decreasing the Dog-Ear Effect to Achieve More Uniform Top Hat Light Field

C. C. Yang, Y. H. Lin, H. Y. Tsai, and C. H. Chou (National Applied Research Laboratories / Taiwan)

The analysis of spot uniformity of laser processing was presented by changing the target plane position and spot size of incident shaper. In order to avoid the Burning or sawtooth-shaped edges effect in laser processing.

02PS2-01

Electronically controllable achromatic linear polarization rotator using tandem twisted nematic liquid crystal

W. L. Cao, T. Y. Chung, and K. T. Cheng (National Central Univ. / Taiwan)

Tandem-2ϕ TNLC is a new polarization rotator design which has achromatism and is not sensitive to the plane of polarization of the incident light. By applying voltage across the rotator, polarization states can be switched.

02PS2-02

Dispersion engineering of silicon nitride micro-resonators via cladding patterning

S. P. Wang, C. K. Chang, and P. H. Wang (National Central Univ. / Taiwan)

We engineer the waveguide dispersion by patterning the cladding with a photoresist-like material. By tailoring the waveguide dispersion by the coverage ratio, this work provides a reconfigurable, flexible way for nonlinear photonics design.

02PS2-03

Side-Polished Fiber Coated With Multilayer Film For Sensing Temperature and Relative Humidity

C. L. Tien and T. Y. Wang (Feng Chia Univ. / Taiwan)

Lossy mode resonance effect combined with side-polished multimode fiber-optic was used to fabricate a temperature and humidity sensor. The sensitivity is 1.2 nm/°C from 30 to 60°C and 1.0 nm/RH% from RH30% to RH60%.

02PS2-04

Optically switchable haze mode light shutters using polymer-network cholesteric liquid crystals

C. T. Huang, C. K. Liu, and K. T. Cheng (National Central Univ. / Taiwan)

This study focuses on the influences of architecture resulted from the adopted polymer networks. The proposed cholesteric liquid crystal light shutter can be switched between transparent and scattering states under the illumination of UV lights.

02PS2-05

Visualization of hand blood information utilizing a filter array type multispectral camera

A. Sato, Y. Ohtera (Toyama Prefectural Univ. / Japan)

A filter-array type multispectral camera was applied to measure and visualize blood flow information under the human skin. The acquired image was processed by principal component analysis, and the slight change of reflection spectrum was detected.

02PS2-06

Numerical Analyses of All-Optical Gate Switches Using Quasi-Phase Matched Periodically Poled Lithium Niobate Devices: Effects on Fabrication Errors

Y. Fukuchi, Y. Kameda, and J. Maeda (Tokyo Univ. of Science / Japan)

Switching characteristics of the periodically poled lithium niobate devices are analysed by considering the fabrication errors. While the performance is independent of the duty-cycle error, the period error must be reduced for proper switch operation.

02PS2-07

One kind of self temperature compensate focus device

S. H. Huang (ABBE Optoelectronics Corp. Limited / Taiwan)

One kind of self temperature compensate focus device introduced here, it made by two fresnel lens with materials of different temperature character to keep the system focus in a wide of range of temperature.

02PS2-08

Multi-terrains staggered LED lighting module for detection microbial specimen

C. N. Hsu, H. Y. Tsai, L. C. Chao (National Applied Research Laboratories / Taiwan), and P. Y. Lin (Yuanpei Univ. / Taiwan, Hospital Yang Ming Branch / Taiwan)

Multi-terrains LED modules were used to obtain photos of the nucleus and cyst edges of microbial specimens, then image calculations were performed to obtain a high-contrast 3D image to establish an AI system for microorganisms.

02PS2-09

Ring-type gratings formed by periodic molecular alignments targeted for spectroscopic polarization measurements

H. Suzuki, A. Emoto (Tokushima Univ. / Japan), N. Furuso (Hayashi Telempu Co., Ltd / Japan), D. Koyama (Doshisha Univ. / Japan), and M. Ishikawa (Tokushima Univ. / Japan)

Ring-type gratings enables optical waves to diffract circularly with wavelength dispersion, which can be used for a specific spectrometer. We have designed and fabricated functional ring-type gratings formed by periodic molecular alignments.

02PS2-10

Theoretical investigation of tunable wavelength filter with TiO_2-based bi-layer subwavelength grating

Y. Takashima, M. Haraguchi, and Y. Naoi (Tokushima Univ. / Japan)

Tunable wavelength filter with TiO_2-based bi-layer subwavelength grating (SWG) was proposed. Utilizing the interference between the eigenmodes within the bi-layer SWG, we obtained sharp peak, whose wavelength position were easily controlled, in reflection spectra.

02PS2-11

Understanding the Influence of Chip Sizes with Composite Metal Substrate for Thin film AlGaInP LEDs

Shreekant and R. H. Horng (National Chiao Tung Univ. / Taiwan)

The performance of different chip sizes on the composite metal substrate was fabricated in order to understand the influence of optical and electrical properties of thin-film AlGaInP LEDs as functions of chip sizes.

02PS2-12

CubeSat Compatible Miniaturized Fiber-Optic Gyroscope

H. P. Chung, S. H. Chang, C .L. Hsieh (National Central Univ. / Taiwan), S. L. Yang, K. H. Huang (Polaris Photonics Ltd. / Taiwan), and Y. H. Chen (National Central Univ. / Taiwan)

We have developed a miniaturized fiber-optic gyroscope (mFOG) for space science applications based on low-earth-orbit CubeSat platforms. This medium-grade mFOG mainly comprises a compact 16-mm-long multifunction integrated optical circuit and a streamlined feedback-controlled logic module.

02PS2-13

Research on UV LED Curing Printing Inkjet Technology

J. C. Chang (National Kaohsiung Univ. of Sciences and Technology / Taiwan)

Design and manufacture UV LED inkjet printing curing light source module by using aluminum substrate multi-chip packaging the inkjet printing market for UV LED curing printing inkjet, UV-curable ink has broad application prospects.

02PS2-14

Wearing an optical notch filter for improving color discrimination of color-blindness evaluated by Farnsworth-Munsell D-15 test

L. S. Shen, T. N. Cheng, C. H. Shih, and J. C. Hsu (Fu Jen Catholic Univ. / Taiwan)

We have studied the color discriminations of adult experimental tests before and after wearing a notch filter, which has a 20-nm full-width at half maximum (FWHM), 7.6% transmittance at the reference wavelength of 580 nm.

02PS2-15

Electro-optical properties of nematic liquid crystals with ionic dopants

C. W. Lin and K. T. Cheng (National Central Univ. / Taiwan)

Ionic dopants transit with electric field causes different alignment of LCs to produce Williams domains, Chevron Structure and dynamic scattering. The dynamic structure of LCs cause randomly polarized light after emitting form the LC cell.

02PS3-01

Demonstration of FMCW LiDAR using a diode laser feedback with PQ:PMMA VBG

Y. H. Chen, T. Y. Chung, and R. R. Chang (National Central Univ. / Taiwan)

An external cavity diode laser (ECDL) feedback with a homemade PQ:PMMA VBG was built and served as the single longitudinal mode, frequency-tunable laser of a FMCW LiDAR system.

02PS3-02

One kind of endoscope which can use to construct the three dimension model of a baglike organ

S. H. Huang (ABBE Optoelectronics Corp. Limited / Taiwan)

One kind of new endoscope introduced here, it consist a new type sensor and a new optical system which can construct the three dimension model of a baglike organ.

02PS3-03

Physiological Analysis of Human Skin based on the Principle Components of Skin Diffuse Reflection Spectrum

S. Y. Chen, P. L. Li, and W. C. Hu (National Central Univ. / Taiwan)

Diffuse reflection spectrum of human skin is dominated by melanin, haemoglobin and scattering. To simplify the analysis of human skin, principle components related to those three factors were identified in these research.

02PS3-04

Plastic Scintillation Optical Fiber Bundle Detector to Estimate the Position of Radioactive Nuclide Using Time-of-Flight Technique

S. Song, J. Kim, J. H. Park, S. Kim, T. Lim, J. H. Kim, and B. Lee (Chung-Ang Univ. / Korea)

A 5 m-long plastic scintillation optical fiber bundle detector has been to evaluate the position estimation characteristics to gamma-ray source. To obtain enhanced spatial resolution, an RC-CR^2 filter was applied.

02PS3-05

Natural-lighting system integrated with beam-splitting and power-generating modules

A. C. Wei (National Central Univ. / Taiwan) and J. R. Sze (National Applied Research Laboratories / Taiwan)

A natural-lighting system, comprising beam-splitting, lighting, and power-generation modules, is proposed to provide the functions of illumination and power generation. The proposed system is expected to enhance the solar-energy utilization of the natural lighting.

02PS3-06

The Optical Mechanism Design of Non-Contact Lens Radius and Thickness Measurement System

H. L. Chen, Z. R. Yu, and W. C. Lin (Taiwan Instrument Research Inst. / Taiwan)

This research is to develop a curvature and thickness measurement system by adopting self-developing non-contact displacement sensor. This system provides the advantages of aligning optical and mechanical axis easily on the metrology frame.

02PS3-07

All Optical XOR Logic Gates formed by Optical Neurons

Y. H. Lu and C. C. Chen (National Central Univ. / Taiwan)

In this study, we propose a design for an all-optical logic XOR gate based on reservoir computing (RC). We could obtain an all-optical logic XOR gate through the input and output signals.

02PS3-08

A one-shot scheme of homodyne detection for holographic storage readout through double-frequency grating-based lateral shearing interferometry

K. H. Huang, Y. W. Yu, T. H. Yang, and C. C. Sun (National Central Univ. / Taiwan)

In volume holographic data storage, a method to decoding the stored phase signal with adequate wave aberration tolerance is highly demanded. We demonstrated a new scheme to decode signal through double-frequency-grating based shearing interferometry (DFGSI).

02PS3-09

A handheld module for deep skin detection and wireless transmission

B. W. Yang (Minghsin Univ. of Science and Technology / Taiwan)

A handheld optical detection module is developed to obtain skin images for cosmetic applications. White and red LEDs and a CMOS detector with WIFI function are equipped to derive surface and deep skin images, respectively.

02PS3-10

Inorganic scintillator array sensor with plastic optical fibers to find the hot spot in the radioactive waste

J. H. Park, S. W. Song, S. H. Kim, T. S. Lim, J. H. Kim, J. Kim, and B. Lee (Chung-Ang Univ. /Korea)

We fabricated the inorganic scintillator array sensor with plastic optical fibers to find the hot spot in the radioactive waste. The position measurement of the hot spot and the gamma spectroscopy were carried out.

02PS3-11

A calibration method for central corneal thickness measurement in a non-contact tonometer with pachymetry

W. W. Wang, K. J. Wang, B. Lin, V. Chang (Crystalvue Medical Corp. / Taiwan), C. L. Tsai (Crystalvue Medical Corp. / Taiwan, National Chiao Tung Univ. / Taiwan), V. Chang (Crystalvue Medical Corp. / Taiwan), and I. J. Wang (National Taiwan Univ. Hospital / Taiwan)

We propose a method to calibrate the pachymetry for central corneal thickness (CCT) measurement which takes into account not only the geometric distortion but also the slit width variation of the Scheimpflug illumination path.

02PS3-12

Surface plasmon resonance prism coupler for antibody/IgM rapid detection

P. H. Tseng and Q. H. Phan (National United Univ. / Taiwan)

A gold-based surface plasmon resonance prism coupler is proposed for detecting the antibody/IgM in 140 mg/dl glucose aqueous solution over the measured range of 0-250 ng/ml in a fast measuring time of 2 munites.

02PS3-13

Fourier ptychographic microscopy for extending depth of field

J. Lim, G. J. Choi (Yonsei Univ. / Korea), H. Choi (Konyang Univ. / Korea), and N. C. Park (Yonsei Univ. / Korea)

We propose the modified system of Fourier ptychographic microscopy (FPM) to modulate the focus to a large extent. To extend the focus range, conjugation optics with an axially scannable mirror is introduced to conventional FPM.

02PS3-14

Measurement of the Object Surface Profile Using a Dual-wavelength Interferometric Technique

K. H. Chen, J. H. Chen, W. E. Bi, D. J. Shen, and C. H. Lin (Feng Chia Univ. / Taiwan)

Based on the characteristics of a dual-wavelength Twyman-Green interferometer, this paper proposes an optical interferometric method for the measurement of the object surface profile. The measurement resolution can be reached a value of 61.42 um.

02PS3-15

An IR depth image repairing method

P. D. Huang, T. K. Wang, Y. W. Yu, T. H. Yang, and C. C. Sun (National Central Univ. / Taiwan)

We often use structure light to calculate image depth. Since there's no technique that can prevent depth information loss from high intensity IR light, this shows the importance of developing a depth image complement method.

02PS3-16

Continuous amplified digital optical phase conjugator with Kitty-SPPCM alignment and adaptive optics

T. H. Lin, C. H. Huang, Y. W. Yu, C. C. Sun, and T. H. Yang (National Central Univ. / Taiwan)

We developed a high-performance continuous amplified digital optical phase conjugate system, with a Kitty self-pumped phase conjugate mirror and adaptive optics to reconstruct the focal point through chicken breast tissue with different thickness.

02PS4-01

Evaluation of Axial Resolution in Holographic Data Storage Based on Compressive Sensing

N. Yoneda, Y. Saita, and T. Nomura (Wakayama Univ. / Japan)

In our previous study, holographic data storage based on compressive sensing has been proposed to increase the recording density with 3-D information. In this study, the axial resolution of a 3-D data page is evaluated.

02PS4-02

Design of a polarization-independent achromatic metalens over the entire visible wavelength range

A. Mizutani and H. Kikuta (Osaka Prefecture Univ. / Japan)

A polarization-independent achromatic metalens has been designed and numerically demonstrated. The metalens consists of cylindrical pillars with different diameters and heights. The calculated focusing efficiency was higher than 80% for non-polarized light.

02PS4-03

Dependence of substrate pulse bias on optical constants of a-C:H film fabricated by the PIG-PECVD method

Y. Kondo, Y. Kakehi, K. Satoh, N. Matsumura (Osaka Research Inst. of Industrial Science and Technology / Japan), and Y. G. Shim (Osaka Prefecture Univ. / Japan)

We accurately measured the optical constants of a-C:H films fabricated by the PIG-PECVD method with various substrate pulse conditions using spectroscopic ellipsometry while considering the graded index layer structure. We further investigated those relationships.

02PS4-04

Image projection simulation of super-resolution optical projection method with single-lens spatial cross modulation

H. Funakoshi (Gifu Univ. / Japan), A. Okamoto, and Y. Lu (Hokkaido Univ. / Japan)

We have proposed a new method to project a super-resolution optical field using spatial cross modulation. Simulation results indicate high-resolution images exceeding the resolution of spatial light modulator can be reconstructed by our method.

02PS4-05

Sensing phosphor temperature in pc-WLEDs using noncontact detection

Q. K. Nguyen, S. K. Lin, C. S. Wu, T. H. Yang, H. Y. Huang (National Central Univ. / Taiwan), B. Glorieux (Univ. of Bordeaux / France), X. H. Lee, Y. W. Yu, and C. C. Sun (National Central Univ. / Taiwan)

A practical approach for measuring phosphor temperature in an operating pc-WLED was studied. This brought advancement in managing the heat dissipation of the LED dies and to stabilize the photometric characteristics of pc-WLEDs.

02PS4-06

Highly-stable microwave generation in space based on iodine-stabilized laser and optical frequency comb

Y. Takeuchi, R. Saito, S. Endo, T. Kurihara, and M. Musha (Univ. of Electro-Communications / Japan)

For the next generation Japanese global navigation satellite system, we propose optical-based stable microwave generation in which optical frequency reference is down-converted into microwave region by using an optical frequency comb.

02PS4-07

Simple and fast FTIR technology application analysis method

C. C. Kuo (National Central Univ. / Taiwan), J. Y. Shih, and H. B. Chen (National Applied Research Laboratories / Taiwan)

The relationship between simple and fast surface technology of functional groups measurement and adhesion enhancement can be determined. It can lead the plastic substrate pass adhesion tape test without thin films peeling.

02PS4-08

Integrated Heralded Single Photon Sources Based on Ti:PPLN and Adiabatic Passage Coupler Waveguides

Y. T. Li (National Central Univ. / Taiwan), Y. R. Chen (National Tsing Hua Univ. / Taiwan), H. P. Chung (National Central Univ. / Taiwan), C. S. Chuu (National Tsing Hua Univ. / Taiwan), and Y. H. Chen (National Central Univ. / Taiwan)

We demonstrate an on-chip heralded single photon source based on a highly-integrated Ti-diffused LiNbO3 waveguide platform comprising a periodically poled lithium niobate photon-pair generator and a broadband adiabatic passage pump filter and polarizing mode splitter.

02PS4-09

Kerr frequency comb modelling in dispersion-engineered lithium-niobate microresonator

P. H. Wang and C. C. Ho (National Central Univ. / Taiwan)

Kerr frequency comb is modelled with Lugiato–Lefever equation from lithium-niobate waveguide resonators. By engineering the waveguide dispersion, a broad comb spectrum is demonstrated associating with temporal cavity solitons.

02PS4-10

Beam shaping applied to a low-temperature annealing laser system base on machine learning

Y. C. Lin, C. C. Yang, C. H. Chou, and W. T. Hsiao (Taiwan Instrument Research Inst. / Taiwan)

This paper explores the application of laser beam shaping in low-temperature annealing systems and introduces machine learning into the back-end process.

02PS4-11

Dynamic tuning of surface plasmon resonance by controlling interparticle distance of Ag nanocube monolayer

A. Mizuno (Shizuoka Univ. / Japan, Japan Society for the Promotion of Science / Japan) and A. Ono (Shizuoka Univ. / Japan)

We demonstrated the dynamic plasmon resonance tuning by controlling the interparticle distance of the Ag nanocube monolayer on the elastic film. The transmitted light color shifted continuously from magenta to yellow by film stretching.

02PS4-12

High Image Contrast of Dual-Color Temporal Focusing Multiphoton Excitation Microscopy by Switching Excitation Wavelength

J. Z. Lai, Y. M. Cheng (National Central Univ. / Taiwan), C. H. Lien (National United Univ. / Taiwan), and F. C. Chien (National Central Univ. / Taiwan)

The temporal focusing multiphoton excitation microscopy with the excitation wavelength switching was implemented to increase the image contrast of the dual-color fluorescence imaging by exciting the wavelengths with the maximum two-photon excitation of different fluorophores.

02PS4-13

Reducing Extinction Coefficient of Optical Thin Film of Anti-reflection Coatings on Curved Surface by Atomic Layer Deposition

T. F. Liu, C. C. Kuo, and C. C. Wang (National Central Univ. / Taiwan)

Atomic layer deposition is applied to deposit the anti-reflective coatings to achieve uniform thickness on curved surfaces and reduce extinction coefficients with lower carbon and nitrogen ratios for increasing thin film transmittance.

June 3, 2021 (Thursday)

Special Session (9:00-9:10) "AR/VR/MR Optics" Opening

Presider:

K. Konno (Konica Minolta / Japan)

Special Session "AR/VR/MR Optics" Opening Session

C. W. Liang (National Central Univ. / Taiwan)

Special Session (9:10-10:25) "AR/VR/MR Optics" (1)

Presider:

K. Konno (Konica Minolta / Japan)

03SS-01 (Invited)

09:10 Optical architecture choices for HoloLens V2 Mixed Reality Head Mounted Display

B. Kress (Microsoft Corporation / USA)

We review the optical architectures in HoloLens V1 / V2 MR Headsets as display engines (LCOS and laser scanner), waveguide grating combiners and optical sensors, (head and eye tracking, and spatial mapping)

03SS-02 (Invited)

09:35 Design of head-mounted light field displays for virtual and augmented reality

H. Hua (Univ. of Arizona / USA)

An integral-imaging based light field head-mounted display, which typically renders a 3D scene by reconstructing the directional light rays apparently emitted by the scene via an array optics, is potentially capable of rendering correct or nearly correct focus cues and therefore solving the well-known vergence-accommodation conflict problem plaguing conventional stereoscopic displays. In this talk, I will present novel methodology and framework for designing and optimizing high-performance integral-imaging based light field head-mounted display. A design example is further given based on the proposed design methodology for the purpose of validation

03SS-03

10:00 Warp Square, 360 Degree Visual Experience by 4K Ultra-short-throw Projector Cave

N. Ohse (Sony Corporation / Japan)

We have developed Warp Square, a 360-degree projector cave using 4K ultra-short-throw projectors and a contrast screen. It has high spatial efficiency and delivers high-quality images with a high contrast ratio. This system has been applied to various multi-person VR experiences. We expect that it will eventually be installed in all homes in the future.

Coffee Break (10:25-10:40)

Special Session (10:40-11:30) "AR/VR/MR Optics" (2)

Presider:

C. W. Liang (National Central Univ. / Taiwan)

03SS-04 (Invited)

10:40 Human perception challenges in AR design

B. Taylor (Facebook Inc / USA)

(To Be Determined)

03SS-05 (Invited)

11:05 Holographic printing technology for fabrication of future holographic optical elements

K. Wakunami (NICT / Japan)

Several types of augmented reality three-dimensional display systems that consist of a holographic optical element used as an optical functional screen are introduced. HOE screens are fabricated by using the wavefront printing technique to be owned by the special design of optical function to form the holographic/light-field images toward the observer. All displays successfully reconstruct the full-color three-dimensional images floating on a transparent HOE screen

Lunch (11:30-13:00)

Optical Design / Simulation / Fabrication (3) (13:00-14:15)

Presiders:

T. X. Lee (National Taiwan Univ. of Science and Technology /Taiwan)
Y. Suzuki (Olympus / Japan)

03S1-11

13:00 **Curved image plane for ultra-thin mobile phone camera design and relative illumination analysis**

Y. H. Liu, W. S. Sun, and G. E. Huang (National Central Univ. / Taiwan)

A curved image plane design for 2 megapixel mobile phone camera by using three lenses will shorten the lens length to 2 mm. The field angle is 64°, the relative illumination is larger than 71.58%.

03S1-12

13:15 **The optical design of a non-contact fundus camera for small animals**

C. F. Ho, W. L. Lin, W. N. Chung, M. W. Hung (National Applied Research Laboratories / Taiwan), Y. S. Hwang, and C. R. Shen (Lin-Kou Chang Gung Memorial Hospital / Taiwan, Chang Gung Univ. / Taiwan)

The aim of this project is developing a non-contact modular fundus camera for in-vivo fundus image and analysis in small animals. A prototype is designed and implemented for in-vivo, non-invasive observation in rat eye.

03S1-13

13:30 **Three dimensional coupling structure optical design and simulation for high power Laser diode**

K. Y. Cheng, H. C. Hsu, and P. Han (National Chung Hsing Univ. / Taiwan)

A novel scheme using 3-d coupling structure to build a laser diode module is proposed. Compared with the traditional 2-d layout, the number of LD is three more with over 90% efficiency without using PBS.

03S1-14

13:45 **Laser White Light Module with Photon Recycling**

S. K. Lin, M. T. Ho, X. H. Lee, T. H. Yang, and C. C. Sun (National Central Univ. / Taiwan)

In this study, we propose an optical design for a high-efficiency white light module based on laser pumping. By the photon recycling with the hemisphere reflector, the efficiency can have about 17% increase than origin.

03S1-15

14:00 **Simulation of Power Distributions of Prescription Sunglasses**

C. Y. Huang (Da-Yeh Univ. / Taiwan)

This study is to simulate power distributions of the prescription sunglasses at different faceform angles by the coordinate transformation method. The results show that the prescription sunglasses display different power maps from the plano sunglasses.

Coffee Break (14:15-14:30)

Optical Systems (3) (14:30-15:45)

Presiders:

T. Y. Chung (National Central Univ. / Taiwan)
H. Mikami (Hokkaido Univ. / Japan)

03S3-10

14:30 **Echo state property of a quantum-dot network for nano-photonic reservoir computing**

N. Tate, Y. Miyata (Kyushu Univ. / Japan), S. Shimomura (Osaka Univ. / Japan), T. Nishimura, J. Kozuka, Y. Ogura, and J. Tanida (Osaka Univ. / Japan)

Two requisite conditions for hardware reservoirs are the echo state property and a corresponding non-linear I/O. We verified these conditions for our prototype QD-based reservoir quantitatively from photon counts extracted from its fluorescence spectra.

03S3-11

14:45 **Development of Local Laser Annealing System Using Optical Fiber Array and Blue Laser Diode**

J. Kosugi, M. Kinoshita, S. Toriyama, T. Kosuge, K. Saito, T. Sawai, Y. Yang, N. Sasaki, J. Gotoh, and S. Sugimoto (V Technology Co., Ltd. / Japan)

We developed local laser annealing system using optical fiber array and blue laser diode which realizes downsizing and cost reduction against conventional optical system. As an example of laser annealing, we introduce crystallization of silicon.

03S3-12

15:00 **Multispectral image sensor utilizing photonic crystal spectral filters and its application to snapshot imaging of agricultural products**

Y. Ohtera and N. Ikeda (Toyama Prefectural Univ. / Japan)

We developed a snapshot-type multi-/hyper-spectral image sensor consisting of all-dielectric multi-patterned spectral filter array and CCD. Spectral images of a fruit at arbitrary VIS/NIR wavelengths were extracted from a single raw image.

03S3-13

15:15 **Lateral and Logitudinal Chromatic Aberration Measurement**

B. H. Peng, C. L. Lin, and C. W. Liang (National Central Univ. / Taiwan)

We measure the longitudinal chromatic aberration and transverse chromatic aberration of lens with the high dynamic range Shack-Hartmann wavefront sensor without a beam collimator. Lens chromatic dispersion is quantified by using three reference RGB wavelengths.

03S3-14

15:30 **Improving Resolution of Lensless Imaging with Higher Harmonics of Fresnel Zone Aperture**

K. Tajima, Y. Nakamura, K. Yamaguchi, and T. Shimano (Hitachi, Ltd. / Japan)

As part of our ongoing research on lensless imaging with Fresnel zone aperture (FZA), we propose a method for improving resolution by using higher FZA harmonics.

Closing Ceremony / Award (15:45-16:15)

Presider:

K. Konno (Konica Minolta / Japan)

Presenter:

C. W. Liang (National Central Univ. / Taiwan)

Closing Remark

H. Tatsuno (Ricoh / Japan)

Poster Session (2) (16:15-17:40)

03PS1-31

Optical filtering of waveguide-fed metasurface with magnetic ripple resonance

C. Y. Yu and C. M. Wang (National Central Univ. / Taiwan)

In this paper, we use a metasurface to alter the coupling strength at the interface, which provides more degrees of freedom to manipulate incident EM wave and waveguide mode as well.

03PS1-32

A 2-D Automatic Illuminance Measurement Technique for ECE Class B Headlamp

S. W. Chen, L. W. Hsiao, C. C. Sun, T. H. Yang, X. H. Lee, C. S. Wu, S. K. Lin, and Y. W. Yu (National Central Univ. / Taiwan)

We demonstrate a system to catch a 2D image for illuminance distribution with imaging system, which can be applied to judge if the projection pattern of a headlamp passes the ECE R113 class B regulation.

03PS1-33

Optical model for LED die operated at UVC of wavelength around 275 nm

N. T. T. Le, S. K. Lin, and C. C. Sun (National Central Univ. / Taiwan)

This paper presents the optical model for a type of LED emitting a wavelength of 275 nm and Fresnel lens design with an acceptable optical utilization factor. The results between simulation and experiment are compared.

03PS1-34

Enhancement of the Spatial Colorful Uniformity of an Anti-glare White Light LED Lamp by Modulating the Shape of Diffuser

N. T. Yin, P. J. Huang, P. Y. Chen, and S. H. Ma (Feng Chia Univ / Taiwan)

In this study, we modulated the appearance of the diffuser which is installed in the downlight to solve the spatial color non-uniformity in the situation of low scattering particle concentration diffuser.

03PS1-35

Calculating Diffraction Loss Maps for Gain-guided Microcavities

C. Kurokawa, Y. Suzuki, Y. Kitagawa, and S. Tezuka (Yokogawa Electric Corporation, Japan)

This study introduces an approximate gain-guided mechanism for MEMS-VCSELs to calculate the mode profiles and diffraction loss maps. Diffraction loss maps are expected to help estimate structural and manufacturing errors and consequently reduce diffraction losses.

03PS1-36

Using Meta-corrector Eliminate Spherical Aberration of Ball Lens

G. Y. Liu, J. W. Pan (National Chiao Tung Univ. / Taiwan), and C. M. Wang (National Central Univ. / Taiwan)

A binary2 surface simulation of meta-correction, correct the aberration of the spherical lens, keep the focus point smaller than diffraction limit. SLM in the experiment to confirm the phase is effective in eliminating spherical aberration.

03PS1-37

Freeform Lens Design for a Beam Shaping System with Arbitrary Rotation Symmetric Profile by using Numerical Method

C. K. Wu and C. M. Tsai (National Chung Hsing Univ. / Taiwan)

A numerical method is applied to design freeform lens to convert a light source with Gaussian profile into an arbitrary rotation symmetric distribution.

03PS1-38

Design and Verification of Quartz Microlens Array for UV Exposure Machine

S. R. Lin, C. C. Sun, and T. H. Yang (Nation Central Univ. / Taiwan)

In this paper we present that we promote the uniformity by using the fly-eye quartz lens in the mask aligner. And got uniformity 3.5 %, collimating angle 1.8°, optical utilization efficiency above 80%.

03PS1-39

Dependence of Image Blurred Edge upon Object Distance Outsie Depth of Focus

J. H. Peng, T. H. Yang, Y. C. Shen, L. Lee, , Y. W. Yu, and C. C. Sun (National Central Univ. / Taiwan)

We developed a calibration process for the imaging luminance measuring devices. For objects outside depth of focus, its blurred edges applied for determining its distance. The luminance of the sources within DOF can be refined.

03PS1-40

Optoelectronic Properties of ZnO2 Nanoparticles - A First-principles Calculations

T. T. Nguyen, T. B. T. Pham, T. P. Vo, and M. T. Dang (Can Tho Univ. / Vietnam)

The first-principles calculation was successfully used to verify the electronic and optical properties of zinc peroxide (ZnO2) nanoparticles. The electronic feature and the frequency-dependent optical properties were computed for the parallel component of electric field polarization.

03PS1-41

Ultra-precision surface texture of silicon wafers processed by an advanced ion polishing

C. H. Shih (Fu Jen Catholic Univ. / Taiwan), H. Y. Wu (National Chung-Shan Inst. of Science & Technology / Taiwan, National Taipei Univ. of Technology / Taiwan), L. S. Shen (Fu Jen Catholic Univ. / Taiwan), L. J. Hsiao (National Chung-Shan Inst. / Taiwan), J. C. Hsu (Fu Jen Catholic Univ. / Taiwan), and Y. H. Liu (National Chung-Shan Inst. of Science & Technology / Taiwan)

An advanced polishing technique of ion polishing has been used to process silicon wafers. This high-level stability and the precision process can achieve the roughness Ra <0.231nm at the finishing optical surfaces.

03PS1-42

Fabrication of Transition-metal Dichalcogenide by Sputtering and Sulfurization on Sapphire

J. H. Wei, L. H. Lee, G. S. Zeng, and S. H. Chen (National Central Univ. / Taiwan)

The ion-beam sputtering deposition was use to deposit molybdenum thin films on sapphire. The molybdenum film and sulfur powder were annealed to form MoS2. The Raman mapping shows that the film thickness is uniform.

03PS1-43

Study of stray light suppression with local blocking technology

C. Y. Hsieh, T. Wu, C. S. Wu, S. K. Lin, X. H. Lee (National Central Univ. / Taiwan), C. C. Sun (National Central Univ. / Taiwan, National Chiao Tung Univ. / Taiwan), T. H. Yang, and Y. W. Yu (National Central Univ. / Taiwan)

This paper is mainly for analysis of LED headlights with optical design meets requirements of the regulations. We provide a treatment without changing the size of the optical mechanism moulding to reduce the stray light.

03PS1-44

Using Matlab to correct triplet chromatic aberration for optimization

S. S. Liang and W. S. Sun (National Central Univ. / Taiwan)

We use an illustration method to correct paraxial ray chromatic aberration and optimally choose three glass materials.

03PS1-45

A method for evaluating to select original images for image processing

H. Y. Chou, H. J. Kuo, C. Y. Huang, and F. Z. Chen (National Applied Research Laboratories / Taiwan)

This paper discusses the FOV, F/#, and MTF of a lens, and a method close to human vision to obtain image which can be used as the original image for image processing and identification.

03PS1-46

Simulation of the Thin-film Uniformity on Different Curvature Substrates

Y. N. Chao, T. J. Chuang, and S. H. Chen (National Central Univ. / Taiwan)

A thin-film deposition system with a planetary tilt substrate holder was used to fabricate thin films. Based on this evaporation system, the simulation of the thin-film uniformity on different curvature substrate has been evaluated.

03PS1-47

Measurement of Higher Light Output in Reduced Graphene Oxide coated Plastic Scintillating Optical Fiber with 60Co Radiotherapy unit

J. H. Kim, H. Y. Shin, S. Song, J. Kim, J. H. Park (Chung-Ang Univ. / Korea), S. W. Hwang (Sangmyung Univ. / Korea), and B. Lee (Chung-Ang Univ. / Korea)

In this study, we enhanced light output of plastic scintillating optical fiber by using reduced graphene oxide. The amount of scintillating light was measured according to number of coating, concentration of reduced graphene oxide solution.

03PS1-48

Analysis of Diffraction Spot Pattern to Obtain a Correct Exposure Distance of Mask Aligner

C. C. Yang, C. F. Ding, H. Y. Tsai, Y. H. Lin, and C. H. Chou (National Applied Research Laboratories / Taiwan)

In the paper, the optimization analysis of semiconductor process was presented for mask aligner lithography with the different size reticle and gaps between mask and wafer. The data could help people to optimize exposure process.

03PS1-49

Growth of GaN/ZnO Thin Films by High Power Impulse Magnetron Sputtering

C. W. Zheng, C. W. Huang, and S. H. Chen (National Central Univ. / Taiwan)

In this paper the high power impulse magnetron sputtering, was applied with low temperature and low cost to grow gallium nitride films on silicon substrate for large area production.

03PS1-50

A Quick Method Design for Volume Holographic Optical Element

R. H. Wu-Yang, C. Y. Cheng, C. C. Sun, Y. W. Yu, and T. H. Yang (National Central Univ. / Taiwan)

We introduced the quick method to find the diffractive direction by phase mismatch visualization based on VOHIL. In comparing to couple mode theory, the quick method is acceptable.

03PS1-51

Surface Charges Induced by Nitride Quantum Wells for SERS

N. T. A. Nguyen and Y. K. Lai (National Central Univ. / Taiwan)

In this study, the metal/InGaN QW structure is investigated as a promising candidate SERS substrate. By using 1D-DDCC, the electron concentration in the structure surface is exceptionally high, which is suitable for the SERS enhancement.

03PS2-16

Tapered bus waveguide design for coupling optimization

Y. X. Zhong (National Central Univ. / Taiwan)

A tapered bus waveguide is proposed to enhance the waveguide-to-resonator coupling. The coupling strength is doubled by tapering down the waveguide width from 1 μm to 0.7 μm, providing better fabrication windows for coupling optimization.

03PS2-17

Filters Designed and Produced for End Pumping and Out Coupler Devices of a Fibre Laser

P. K. Chiu, D. Y. Chiang, C. N. Hsiao, and F. Z. Chen (National Applied Research Laboratories / Taiwan)

The pass filters were produced by ion beam assisted electric gun deposition process, based on the design of Bragg fibre grating and used as an end pumping and out coupler device in Yb-doped fibre laser system.

03PS2-18

Characteristic Enhanced Latent Bruising Image Using Low Wavelength LED Light

H. Y. Tsai, C. R. Li, Y. C. Hsieh, Y. H. Lin, and K. C. Huang (National Applied Research Laboratories / Taiwan)

Bruising on the skin was usually slightly trace under white light irradiation. The study presented that the injured area can be evidently observed under irradiation of low wavelength light; especially at 415 nm.

03PS2-19

LC phase retarders supported by PtSe2 2D transition-metal dichalcogenide

V. M. Gospodinova (National Chiao Tung Univ. / Taiwan) and D. Z Dimitrv (IOMT-BAS / Bulgaria)

PtSe2 films were synthesized by thermally assisted selenization of pre-deposited Pt in horizontal quartz-tube reactor. Based on optical and electrical measurements, PtSe2 has been proposed as supporting electrodes for tuneable liquid crystal phase retarders

03PS2-20

Image stitching detection system for assessing tooth condition of milling cutter

C. R. Li, H. Y. Tsai, K. C. Huang, and J. A. Yeh (National Applied Research Laboratories / Taiwan)

Use the contour image capture mode to make the camera follow the trajectory of tooth surface to obtain a continuous image, therefore the 2D milling tooth model can be established and analyzed the tooth condition.

03PS2-21

Polarization Rotator With Photonic Crystals On SOI

K. C. Chan and C. C. Chen (National Central Univ. / Taiwan)

We Report that the performance of the polarization rotator in silicon on insulator waveguide using photonic crystals. The effects of the structure geometrical parameters are studied to maximize the polarization conversion ratio of the device.

03PS2-22

Optical, chromatic and mechanical properties of zirconium nitride films deposited by electron beam evaporation with ion-assisted deposition

H. Y. Lin and C. L. Tien (Feng Chia Univ. / Taiwan)

The zirconium nitride films were prepared by electron beam evaporation with ion-assisted deposition. The colours of ZrNx films were silver, gold, blue and green. Residual stress was -1.051 GPa for film thickness of 84.3 nm

03PS2-23

The Development of Optical Mirror by Different Types of 3D Printing Technique

C. Y. Huang (Taiwan Instrument Research Inst. / Taiwan), A. C. Wang (Chien Hsin Univ. of Science and Technology / Taiwan), C. F. Ho, H. J. Kuo, J. C. Chen, and P. H. Lin (Taiwan Instrument Research Inst. / Taiwan)

In this study, an optical aspheric reflection module was printed by different types of 3D printing technique. The profile and roughness of the aspherical surfaces in printing, turning, and polishing process were analysed in this paper.

03PS2-24

The Analysis of the Radiation Distributions of RGB Micro-LED

W. Y. Peng, C. W. Chu, B. M. Chen, and S. P. Ying (Minghsin Univ. of Science and Technology / Taiwan)

In this study, the radiation distribution of RGB micro-LEDs with or without encapsulant was studied. A simulation model is developed for RGB micro-LED devices and the radiation distribution is analyzed.

03PS2-25

Nitride Semiconductors for SERS Applications

T. F. Zhang and K. Y. Lai (National Central Univ. / Taiwan)

InGaN layers were grown by metal-organic chemical vapor deposition (MOCVD) for the application in surface enhanced Raman scattering (SERS). It is found SERS intensities of R6G molecules are effectively increased by the InGaN layer.

03PS2-26

MOCVD Growth of Two-dimensional BN layers

C. P. Huang, J. I. Chyi, and K. Y. Lai (National Central Univ. / Taiwan)

Two-dimensional (2D) boron nitride (BN) layers were grown on 2-inch sapphire by metal-organic chemical vapor deposition (MOCVD). According to the studies with x-ray diffraction, the 2D BN layers exhibit mixed cubic and rhombohedral structures.

03PS2-27

The Optical Characteristics of Light-Emitting Diodes Covered with Leaf Structure Surface Layer

K. J. Hunag, B. M. Chen, and S. P. Ying (Minghsin Univ. of Science and Technology / Taiwan)

In this study, the bio-inspired structures are used to reduce the total internal reflection at the encapsulant/air interface in LED package, and then improve light extraction efficiency of the LED package.

03PS2-28

Extension of Space-Bandwidth Product with Optical Channel Multiplicator for Digital Holography Microscope

J. J. Wang, Y. W. Yu, C. C. Sun, and T, H. Yang (National Central Univ. / Taiwan)

We increase space-bandwidth product by Optical Channel Multiplicators. It is intended to increase resolution at the same FOV for sparse samples. The implement of OCM can increase pixel size of CMOS sensor in DHM.

03PS3-17

Design of a wide field-of-view windshield-type head-up display using a single freeform mirror

W. J. Peng, Y. C. Cheng (National Applied Research Laboratories / Taiwan), T, X. Lee (National Taiwan Univ. of Science and Technology / Taiwan), M. F. Chen, and W. L. Lin (National Applied Research Laboratories / Taiwan)

The windshield–type head-up display for the augmented reality application is presented in this study. A single freeform mirror is employed to achieve the FOV of $10^{\circ} \times 3^{\circ}$ and the eyebox of 130 mm × 50 mm.

03PS3-18

High Throughput Fluorescence Microarray Scanner with a Dynamic Autofocus Function

R. Y. Tsai, J. P. Chen, F. H. Lo, C. C. Pien, J. D. Lee, J. C. Yang, K. W. Hsu, R. Lo, C. H. Liao, K. Yan, and G. Tiao (Caduceus Biotechnology Inc. / Taiwan)

A high throughput SpinScan microarray scanner with a dynamic autofocus function used for microarray measurement is evaluated and compared with conventional scanners.

03PS3-19

OTF measurement using Ronchi grating

T. Hagiwara (Nikon Corporation / Japan)

Novel Optical transfer function (OTF) measurement method using Ronchi grating is proposed; measurement principle and its advantage to conventional methods is described; concept was proven by experiment using commercially available smart phone lens.

03PS3-20

Development of Fast Optical Heating Module for Polymerase Chain Reaction

L. C. Chao, H. Y. Tsai, C. N. Hsu (National Applied Research Laboratories / Taiwan), and D. B. Shieh (National Cheng Kung Univ. / Taiwan)

Polymerase Chain Reaction is the method to copy the specific deoxyribonucleic acid region. The optics method was employed in this study to heat reagent by a laser diode and NIR-LED at 808 nm.

03PS3-21

Development of an external cosmetic skin detector for mobile devices

B. W. Yang (Minghsin Univ. of Science and Technology / Taiwan)

An external skin detection module equipped with multiple LEDs and polarization device is used in mobile phones to achieve cosmetic skin imaging, which can be applied to establish user's skin indicators for skin care applications.

03PS3-22

Optical design of a gloss meter for zirconia anterior crown

M. Y. Hsu (National Synchrotron Radiation Research Center / Taiwan) and H. C. Chang (National Applied Research Laboratories / Taiwan)

We simulated the optical path of a 60° glossmeter to measure the brightness of zirconia anterior crown, and determined the adjustable spot size of the glossmeter was 1–3.8 mm to satisfy the clinical measure.

03PS3-23

Characterization optical properties of collagen denaturation by Stokes-Mueller matrix polarimetry

B. H. Liu and Q. H. Phan (National United Univ. / Taiwan)

A Stokes-Mueller matrix polarimetry formalism is proposed for detecting collagen structure in different solvents namely aqueous and glucose solution based on linear dichroism and circular birefringence properties.

03PS3-24

Automated optical inspection based on off-axis digital holographic microscope

Y. C. Chen, W. L. Wang, Y. W. Yu (National Central Univ. / Taiwan), I. J. Chen (Southport Co. Ltd. / Taiwan), C. C. Sun, and T. H. Yang (National Central Univ. / Taiwan)

This paper presents an inspection of defect on reflective surface based on digital holographic microscope ,and holes melt by laser on the circuit board was set as test-object. It shows high flexibility in different situations.

03PS3-25

BSDF meter and measurement of a 3M Scotch® Magic™ Tape

W. H. Wu, C. C. Sun, Y. W. Yu, and T. H. Yang (National Central Univ. / Taiwan)

We combined flat screen and image synthesis (SIS) to develop a high speed scatterometer to achieve a fast and factual way to measure the bidirectional scattering distribution function (BSDF).

03PS3-26

Photoacoustic Microscopy Based on Compressive Sensing Ghost Imaging System

J. C. Wang and T. Y. Chung (National Central Univ. / Taiwan)

An architecture of photoacoustic microscopy integrated with a brand-new sampling modality, compressive sensing, speeds up the photoacoustic micro image acquisition process.

03PS3-27

View and Depth Expansion System for Microscope Photography Based on Dual Ultrafast Switching Mirrors

S. Hu, W. Lu, K. Shimasaki, and I. Ishii (Hiroshima Univ. / Japan)

This paper proposes a microscope photography system for both view and depth expansion utilizing dual ultrafast switching mirrors and high-speed vision. The effectiveness of the proposed method is demonstrated through view and multi-depth expansion experiments.

03PS3-28

Differential Mueller Matrix Polarimetry for Antibody/IgG Rapid Detection

Z. W. Yang and Q. H. Phan (National United Univ. / Taiwan)

A differential Mueller matrix polarimetry enhanced by surface plasmon resonance prism coupler is proposed for detecting the antibody/IgG in aqueous solution over the measured range of 0-250 ng/ml in a fast measuring time of 2 munites.

03PS3-29

Design of a dual function lens for dark-field condenser and optical tweezers

C. L. Tsai, L. Hsu, and K. Y. Hsu (National Chiao Tung Univ. / Taiwan)

We design and fabricate a dual function lens with 1.28 of NA and 28 mm of entrance pupil. It works as a dark-field lens offering not only low energy loss but also optical trapping.

03PS3-30

Scattering-angle-resolved imaging using multiwavelength coaxial aperture

H. Ohno (Toshiba / Japan)

An optical system that is able to capture an image resolved by light-scattering angle using multiwavelength coaxial aperture is proposed here to measure material surface properties.

03PS4-14

Optimal Coupling for Low-threshold Microcomb Generation

P. H. Wang and K. L. Chiang (National Central Univ. / Taiwan)

We theoretically model the threshold for microcomb systems with coupling scaling. The minimal threshold is numerically solved and altered from the under-coupled to over-coupled regime in the presence of the nonlinear resonance shift.

03PS4-15

Plasmonic Photocatalytic Reaction Modulated by Static Magnetic Field

H. J. Huang (National Applied Research Laboratories / Taiwan), Y. H. Wang (National Taiwan Univ. / Taiwan), Y. F. Chou Chau (Univ. Brunei Darussalam / Brunei), H. P. Chiang (National Taiwan Ocean Univ. / Taiwan),and J. C. S. Wu (National Taiwan Univ. / Taiwan)

The OH– ions are condensed around the deposited TiO2 NPs in micro optofluidic chip reactors by a magnetic field and was demonstrated to enhance the photocatalytic degradation of methyl orange.

03PS4-16

The Effect of Music on Frontal Electroencephalogram (EEG)

H. C. Huang, Y. C. Chen, and C. C. Chen (National Central Univ. / Taiwan)

The aim of the present study is to examine the effect of music stimuli on human brain using electroencephalogram. This study compares the effects of four types of music on the frontal lobe.

03PS4-17

Measurement of Guitar Using Laser Displacement Sensor

K. C. Su and W. C. Lin(National Central Univ. / Taiwan)

We report the experimental setup and the spectra of guitar by using laser displacement sensor. The two different materials which placed under the guitar and the two perpendicular plucking directions are discussed in this experiment.

03PS4-18

Artificial Neural Network Computing Using Brainwaves : Music Composition

L. Y. Chen, Y. C. Chen, and C. C. Chen (National Central Univ. / Taiwan)

We demonstrate an artificial intelligence with personality. The neural networks are incorporated with brainwaves. The musical composition is performed to demonstrate the calculation system. Paganini's Caprice no. 24 is used for training task.

03PS4-19

Simulation of Near-Field Light for Cylinder and Cone Type Nano-Antennas in Ring-Resonator-Type Device for Heat-Assisted Magnetic Recording

J. Chen (Nanjing Univ. of Science and Technology / China, Fukuoka Inst. of Technology / Japan), R. Katayama (Fukuoka Inst. of Technology / Japan), and S. Sugiura (InnovaStella, Inc. / Japan)

The dependence of the size and energy density of the near-field light on the curvature of the nano-antenna tip and diameter of the nano-antenna bottom was numerically simulated to optimize the shape of the nano-antenna.

03PS4-20

Soft Ceramic LED Phototherapy Mask and its Application

R. S. Chang and L. Y. Huang (National Central Univ. / ROC.)

Our mask is made of soft ceramic RGB PCB LED, is for blood-circulation 、 Regulate-melanin 、 kill bacteria. The ceramic composite material is soft (< Shore A30) corrosion-resistance. Water-resistance (IP67) and can also applied to soft display wearable device etc.

03PS4-21

Highly Sensitive and Tunable Plasmonic Sensor Based on a Nanoring Resonator with Silver Nanorods

L. M. Chiang, C. T. Chou Chao (National Taiwan Ocean Univ. / Taiwan), Y. F. Chou Chau (Univ. Brunei Darussalam / Brunei), H. J. Huang (National Applied Research Laboratories / Taiwan), and H. P. Chiang (National Taiwan Ocean Univ. / Taiwan)

We investigate a highly sensitive and tunable plasmonic refractive index sensor composed of a metal-insulator-metal waveguide with a side-coupled nanoring, containing silver nanorods using the finite element method. Results show a sensitivity of 2080 nm/RIU.

INSTRUCTIONS FOR SPEAKERS

All speakers are required to register for participation in ODF'20 in 2021. English will be used for all presentations and printed material.

Oral presentation

Oral session is to be held in "Kwoh-Ting Optics and Photonics Building (IL-104)". The presentation time will be 25 minutes for invited papers (including 5 minutes discussion) and 15 minutes for regular papers (including 3 minutes discussion). Attention bell will be given three times as in the table below. A PC-based data projector and a computer equipped with USB ports are available. Speakers are asked to bring in their own personal computer or USB memory (Windows based). Prior to the starting time of the session, the speakers are asked to contact the session chairs and to confirm the connection between their computer and the projector.

Online oral presentation

WebEx meeting link will be sent to presenter by ODF account email by 26 May. Please click the WebEx link and join the meeting. Speaker might be asked to enter an event password in the meeting invitation email. Be sure that your audio and video is turned on. To share a file, such as a Microsoft PowerPoint presentation, please click the "Share content" button in the WebEx control panel and select "Share File". Once you start screen sharing, your video will move to the upper right-hand corner and may potentially cover text or images. Please adjust your presentation accordingly. The presentation time will be 25 minutes for invited papers (including 5 minutes discussion) and 15 minutes for regular papers (including 3 minutes discussion).

Pre-recorded video presentation

Uploaded link will be sent to you by ODF account email by 15 March. Be sure to record and upload your presentation by 23 May. Video length is limited to 25 minutes for invited presentation and 15 minutes maximum for contributed presentation if speaker can't participate online. On the other hand, if the speaker can participate online, please limit video length to

20 minutes for invited presentation and 12 minutes maximum for contributed presentation. Program committee strongly recommend the speaker to participate online and interact with the participant even the pre-recorded presentation is opted. (Allowed file formats: mp4 / wmv / avi / pptx / ppsx, file size < 200 MB).

(1) Presentation time

	Presentation	Discussion	Total
Plenary Session	20min.	5min.	25min.
Special Session			
Invited Papers			
Contributed Papers	12min.	3min.	15min.

(2) Attention bell

	1st bell	2nd bell End of Speech	3rd bell End of Discussion
Plenary Session	15min.	20min.	25min.
Special Session			
Invited Papers			
Contributed Papers	10min.	12min.	15min.

Poster presentation

Poster session will be held in "BF, Kwoh-Ting Optics and Photonics Building" on Wednesday, 2 and Thursday, 3 June.

	Time	Date
Poster Session (1)	Preparation: 12:00-16:40 Presentation: 16:55-18:20 Removal: By 18:50	Wednesday 2 June

Poster Session (2)	Preparation: 12:00-16:00 Presentation: 16:15-17:40 Removal: By 18:10	Thursday 3 June

Poster boards will be around 1.8 m high and 0.90 m wide double sided boards, on which A0 portrait (841 x 1189 mm) can be placed. Poster should have minimum font size for text of 18 pt. Text and graphics should be readable from at least one meter.

Authors must remain in the vicinity of the bulletin board for the duration of the session to answer questions in English. Authors are allowed to continue the discussion after the end of session if necessary, but are required to remove all the materials on the bulletin board within 30 minutes after the session.

To start the session on time each author must complete the preparation 15 minutes before. Poster number will be displayed at upper left side on the bulletin board.

Online poster presentation – only for international

Please provide a one-page poster PDF by 23 May (PDF size < 3MB). The poster is in the format A0 portrait (841 x 1189 mm) with minimum font size for text of 18 pt. Uploaded link will be sent to you by e-mail. For off-site presenter, please also submit a recorded presentation by 23 May. (Allowed file formats: mp4 / wmv / avi / pptx / ppsx, size < 200 MB). Participate in real-time and asynchronous discussion with attendees via E-poster (Online poster system). Each poster will have a dedicated page that will include a video (for off-site presenter) and a poster PDF, as well as an embedded chat window displaying the chat dialog with which to engage directly with an audience. For online presentation, please join the E-poster system from the ODF' 20 in 2021 website 10 minutes before each poster session.

BEST PAPER/POSTER AWARD

The best paper and best poster among the contributed papers will be awarded through the examination by the program committee at the Closing Ceremony.

STUDENT PAPER/POSTER AWARD

To encourage students to participate in the conference, one paper and one to two posters that are presented by students will be selected for the student paper and student poster award respectively in each conference category. The award examination will be evaluated by the program committee as well.

POST-DEADLINE PAPERS

Post-deadline papers will be accepted for presentation in poster session. Latest and significant results obtained after the regular deadline are most welcome. Please submit your 35-word Abstract & 2-page Manuscripts on the ODF'20 in 2021. For the layout of manuscript, please see the Guidelines on the ODF' 20 in 2021 website.

The deadline for submission of post-deadline papers is on April 6, 2021.

Review result will be noticed by April 21, 2021. The copyright of the article published in the ODF'20 in 2021 Technical Digest is to be transferred to the National Central University (NCU) and Optical Society of Japan (OSJ). The authors are required to agree to the copyright transfer when the 35-word abstract and the 2-page manuscripts are submitted.

For inquiries, please contact:
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ODF'20 in 2021 SPECIAL FEATURE OF OPTICAL REVIEW

The special issue of OPTICAL REVIEW, the journal of the Optical Society of Japan, for the 12th International Conference on Optics-Photonics Design & Fabrication "ODF'20 in 2021, Taoyuan" will be published in April, 2022. All contributors of ODF'20 in 2021 are strongly encouraged to submit their original papers for this special issue. Submissions from invited speakers are also welcome.

Submissions will be accepted from June 4th, 2021 to August 31st, 2021. Please check the website for the application form.

Please note that all the submitted papers must be at least 4 pages in length and will be accepted based on the editorial policy of OPTICAL REVIEW.

The following is the submission site of Springer, the publishing company.
http://www.edmgr.com/opre/default.aspx

If you need further information, please contact Kenji Konno at the address below:

Kenji Konno
Topical Editor, ODF'20 in 2021 Special Issue
Konica Minolta Inc., Japan
E-mail: or_special_issue@odf.jp

ODF'20 in 2021 SPECIAL FEATURE OF OSA CONTINUUM

The special feature of OSA Continuum, the journal of The Optical Society (OSA), for the 12th International Conference on Optics-Photonics Design & Fabrication "ODF'20 in 2021, Taoyuan" will be published in October 15th, 2021. All contributors of ODF'20 in 2021 are strongly encouraged to submit their original papers for this special issue. Submissions from invited speakers are also welcome.

Submissions will be accepted from June 1th, 2021 to August 31st, 2021. Please check the website for the application form.

Please note that all the submitted papers will be accepted based on the editorial policy of OSA Continuum.

The following is the submission site of The Optical Society (OSA).
https://www.osapublishing.org/osac/home.cfm

If you need further information, please contact Chao-Wen Liang at the address below:

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REGISTRATION

● Registration Fee (USD)

The registration fee includes admission to technical sessions and one copy of Technical Digest (for on-site participation only), additional copies of Technical Digest are available at a per copy charge of US$50. As for the person who paid the registration fee, the reception banquet fee is free except for students and on-line participation. Students who wish to join the reception banquet, an additional US$50 are required in addition to the registration fee.

On-site Presenter	US$ 150/NT$ 4500	Incl. banquet
On-site Attendee	US$ 150/NT$ 4500	Incl. banquet
Student	US$ 50/NT$ 1500	Excl. banquet
Online Presenter*	US$ 100/NT$ 3000	Excl. banquet
Online Attendee**	Free	Excl. banquet

[*] Restricted to presenters outside of Taiwan.
[**] Restricted to attendees outside of Taiwan.

● Registration

Those who wish to attend ODF'20 in 2021, Taoyuan are required to make an on-line registration. The on-line registration will be available in the ODF'20 in 2021 website.

● Accompanying persons

Participants can register accompanying persons. Accompanying persons are his/her family members. Registration fee for each accompanying person is US$75, which includes all expenses except admission to the technical session, conference pack and one copy of the Technical Digest.

● Cancellation Policy

There will be no refunds for the registration fee.

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ACCOMMODATION

The conference has prepared a variety of hotel rooms in the university guest house and hotels nearby with special discounts for the attendee. They are as follows:

South Garden Hotels and Resorts 南方莊園

(ODF'20 in 2021 Conference discount)

Distance from NCU campus: ~ 2.2 km

Tel: 886-3-420-2122 Fax: 886-3-420-7279

Discount method:

Make a reservation from ODF'20 in 2021 website.

Hotel Kuva Chateau 古華花園飯店

(ODF'20 in 2021 Conference discount)

Distance from NCU campus: ~ 3.8 km

Tel: 886-3-281-1818 Fax: 886-3-281-1616

Discount method:

Step1: Download and fill in the reservation form.

Step2: Email the reservation form to:
resv@kuva-chateau.com.tw

HOTEL IN 三揚精品商旅

Distance from NCU campus: ~ 2.8 km

Tel: 886-3-491-3999 Fax: 886-3-491-0999

Hotel j 日月光國際飯店

Distance from NCU campus: ~ 3.0 km

Tel: 886-3-491-6018 Fax: 886-3-491-6339

Note: The hotel room rate may vary, depending on the demand, seasonal promotions, or travel agents.

TRANSPORTATION

The NCU campus is accessible from Taiwan Taoyuan International Airport (TPE) by taxi, buses, or driving a car. As no direct connection between the airport and the NCU campus, a metered taxi may be the most convenient option.

By Taxi

Taxi service can be found outside the Arrival Halls at the TPE and a one-way (~40 min) fare normally charges NTD 800~1000 (USD 26~33).

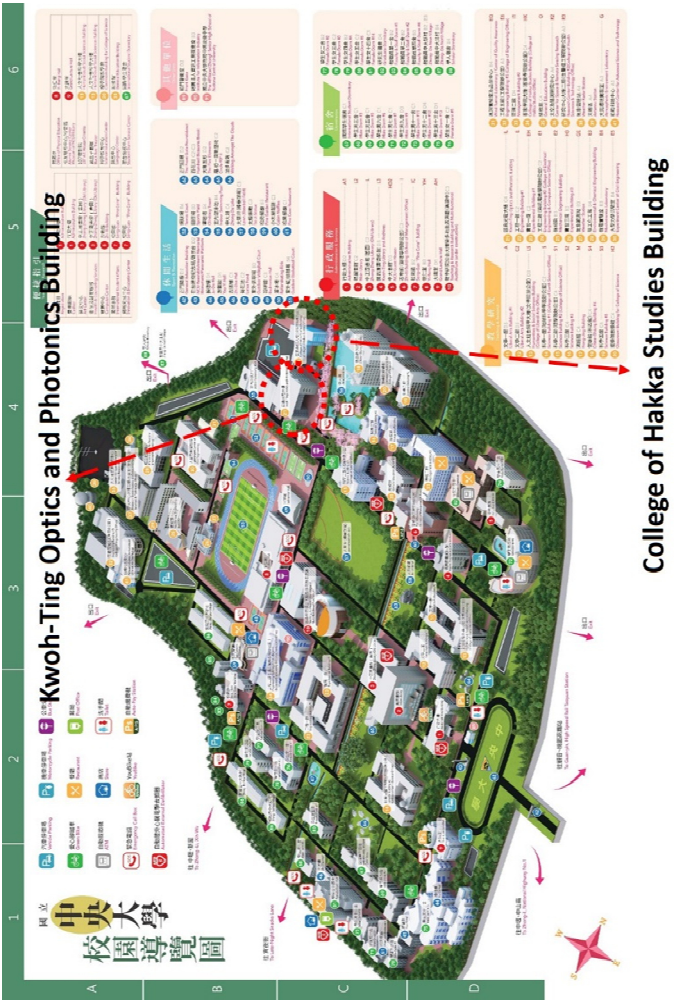
By Bus

Get to Taoyuan High-Speed Rail Station by Taoyuan Metro from Taoyuan International Airport. Then transfer to the city bus No. 132 or No. 172 (at Bus Platform 8) heading for NCU (a 15- to 20-minute ride).

For more detailed information, please scan the QR code

VENUE

ODF'20 in 2021 will be held in Kwoh-Ting Optics and Photonics Building and College of Hakka Studies Building, at National Central University (NCU), Chung-Li District, Taoyuan City, Taiwan, R.O.C.. The two buildings are within 2-minute walking distance. The corresponding numbers of the two buildings are 21 and 34, respectively, on the NCU campus map shown below.



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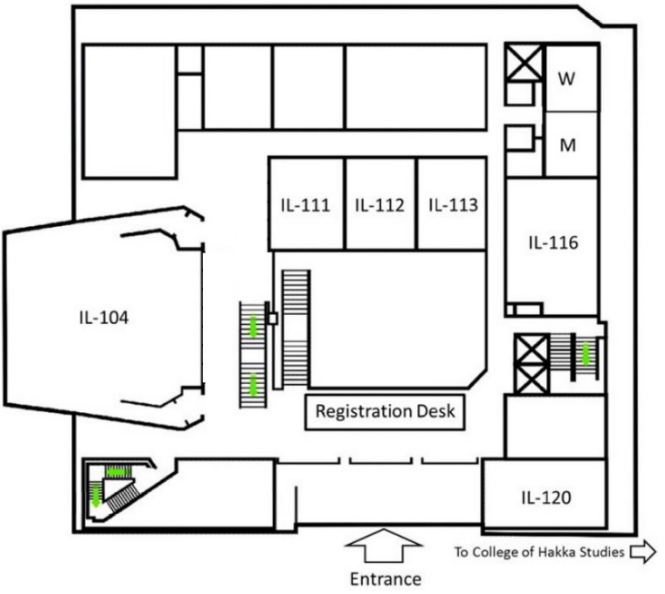

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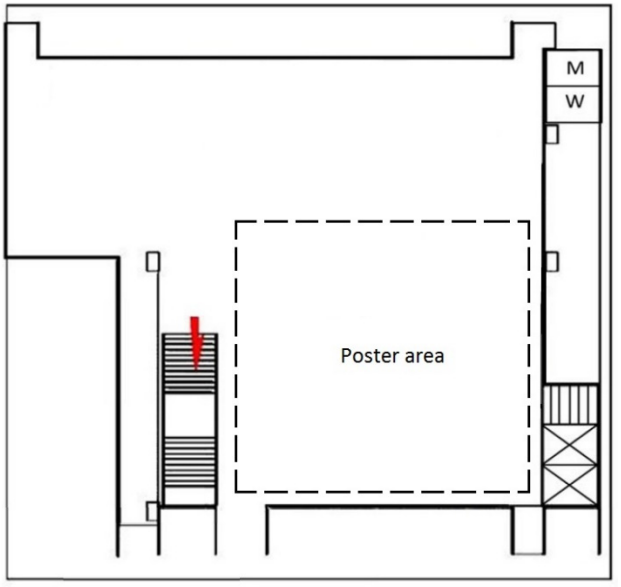
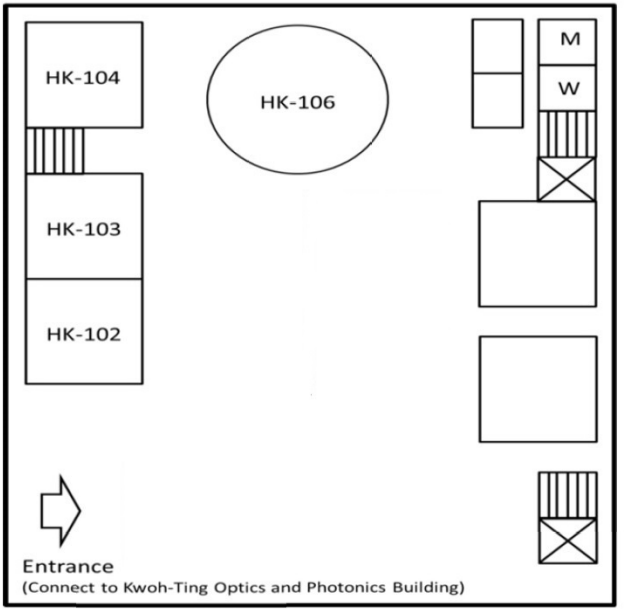


College of Hakka Studies Building 1F



CYBERNET SHORT COURSE

Optical & Illumination Seminar

In response to the development trend of the optoelectronic industry, CYBERNET SYSTEMS TAIWAN holds Optical & Illumination Seminar annually to share the latest solutions for the most popular optical design such as sensor, AR, VR, MR, laser, opto-communication, lens, display, and lighting. This year, CYBERNET SYSTEMS TAIWAN co-organizes the event with ODF'20 in 2021 and invites domain experts from Synopsys Inc., Arima Lasers Corp., NTUT, NCTU, NCCU, and application engineers from CYBERNET SYSTEMS TAIWAN to share instant insight of the up-to-date optoelectronic technology. These lectures, provided as local short courses including four parallel tracks, are free and registration required. The live-streaming of the Cybernet Short Course will not be given, indicating that the short course will open for the on-site attendees only, and not be available to the on-line attendees of ODF'20 in 2021, Taoyuan. However, available seats are limited. Prior registration is recommended through the online registration system.

CYBERNET TIME TABLE

June 3, 2021 (Thursday)	
08:10	Registration
09:00 10:40	CYBERNET -ODF'20 in 2021 Special Session Kwoh-Ting Optics and Photonics Building (IL-116)
11:30	Lunch
13:00	CYBERNET Short Course* Kwoh-Ting Optics and Photonics Building (IL-111、IL-112、IL-113、IL-116、IL-203) College of Hakka Studies Building (HK-106)

*The corresponding rooms for the four tracks of Cybernet Short Course will be announced.

June 3, 2021 (Thursday)

Track A- Sensing/AR/VR/MR

13:30-14:10

A01- Designing and analyzing a LiDAR system

M. Lu (CYBERNET SYSTEMS TAIWAN / Taiwan)

14:25-15:05

A02- Integrated simulation platform for planar diffractive waveguides in augmented reality displays

Y. C. Cheng (National Taipei Univ. of Technology / Taiwan)

15:25-16:05

A03- Tools for freeform optics design in CODE V

P. Huang (CYBERNET SYSTEMS TAIWAN / Taiwan)

16:20-17:00

A04- Design AR/VR devices using multi-domain optical simulations, simulation and design using RSoft device tools and LightTools

D. Herrmann, J. Jacobsen, S. Mulder, T.Y. Su, and Y. Zhou (Synopsys Inc. / USA)

Track B- Laser & Opto-Communication

13:30-14:10

B01- Application of LaserMOD in laser device structure design

J. Y. Hsing (Arima Lasers Corp. / Taiwan)

14:25-15:05

B02- Hybrid III-V silicon laser in LaserMOD

K. Chen (CYBERNET SYSTEMS TAIWAN / Taiwan)

15:25-16:05

B03- Optical couplers design and the influence in communication system performance

P. Hsu (CYBERNET SYSTEMS TAIWAN / Taiwan)

16:20-17:00

B04- Simulation and analysis of VCSEL

T. C. Lu (National Chiao Tung Univ. / Taiwan)

Track C- Lens

13:30- 14:10

C01- Optical design example with thermal influence

R. Hu (CYBERNET SYSTEMS TAIWAN / Taiwan)

14:25-15:05

C02- Structural, thermal and optical performance analysis supported by Synopsys' CODE V

M. Novak (Synopsys Inc. / USA)

15:25-16:05

C03- Choosing the best solution for diffraction analysis

R. Hu (CYBERNET SYSTEMS TAIWAN / Taiwan)

16:20-17:00

C04- Improve the accuracy of lens stray light analysis with BSDF measurement data

F. Cheng (CYBERNET SYSTEMS TAIWAN / Taiwan)

Track D- Display & Lighting

13:30-14:10

D01- Leveraging the SOLIDWORKS link module's new capabilities

P. Le Houillier and b. ing. (Synopsys Inc. / USA)

14:25-15:05

D02- Optical measurement and analysis for mLED panel

F. Cheng (CYBERNET SYSTEMS TAIWAN / Taiwan)

15:25-16:05

D03- MiniLED backlight structure and dynamic backlight design

Z. T. Ye (National Chung Cheng Univ. / Taiwan)

16:20-17:00

D04- Simulation of micro-LEDs by Synopsys tools

C. Xu (Synopsys Inc. / USA)

Deadlines

Post Deadline Papers：	April 6, 2021
Online Registration：	May 23, 2021
On-site Registration：	June 1-3, 2021

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