ADVANCE PROGRAM

ISOM'14

International Symposium on Optical Memory 2014

Lakeshore Hotel
Hsinchu, Taiwan
October 20-23, 2014

Deadlines

Post Deadline Paper:
Sep. 1, 2014

Pre-registration:
Sep. 20, 2014

http://www.isom.jp/

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Symposium Schedule

	Monday / Oct. 20	Tuesday / Oct. 21	
	Registration (15:00 - 17:20)	Registration (8:30 - 13:00)	
09:00			09:00
		Tu-A Opening & Keynote	
10:00			10:00
		Tu-B High Density Recording	
11:00			11:00
		Break	
12:00		Tu-C Medical and Bio Optics Technologies	12:00
13:00	T-1 Tutorial Seminar	Lunch	13:00
14:00			14:00
		Tu-D Nano Photonics 1 (Special)	
15:00	Break		15:00
	T-2 Tutorial Seminar	Break	
16:00			16:00
	Break	Tu-E Hologram 1	
17:00	T-3 Tutorial Seminar		17:00
18:00			18:00
	Get Together		
19:00			19:00
20:00			20:00
21:00			21:00

	Wednesday / Oct. 22	Thursday / Oct. 23	
	Registration (8:30 - 13:00)	Registration (8:30 - 12:00)	
09:00	We-F Media and Material Science	Th-K Hologram 2	09:00
10:00	We-G Taiwan Special Session		10:00
		Break	
11:00	Break	Th-L Optical/Photonic Interconnect (Special)	11:00
12:00	We-H Nano Photonics 2 (Special)		12:00
	ISOM'15 Anounce & Photo	Lunch	
13:00	Lunch		13:00
14:00		Th-M Memory Systems	14:00
15:00	We-I Image Sensing Technologies		15:00
16:00		Th-PD Post Deadline	16:00
	Break	Award & Closing	
17:00	We-J Poster Session		17:00
18:00			18:00
	Break		
19:00	Banquet		19:00
20:00			20:00
21:00			21:00

WELCOME STATEMENT FROM THE ORGANIZING COMMITTEE CHAIRPERSON

The 24th International Symposium on Optical Memory 2014 (ISOM'14) will be held in Hsinchu, Taiwan from Oct. 20 to 23, 2014.

On behalf of the International Symposium on Optical Memory (ISOM) organizing committee, I am delighted to welcome all of you to the ISOM'14 in Taiwan.

The last ISOM meeting was held in Incheon, Korea. It was very successful to share new developments of high density recording, optical memory systems, and signal processing, media and new materials, etc. New applications of optical memory technologies were introduced in the special sessions. They have been extended to medical and bio-technologies, display, sensing, information processing. Optical memory technologies have many potential to produce new applications and to extend current technologies in many applications.

We are very proud of the ISOM activities, because many of technologies leading new developments and new applications have been first presented and discussed in ISOM meeting. Since the first ISOM meeting in 1987, ISOM has led innovation of optical memory and economic growth in optical industry.

I sincerely ask all of ISOM'14 participants to discuss on new technologies of the next generation optical memory and new applications of optical memory technologies in coming ISOM'14.

Yoshimasa Kawata
ISOM'14 Organizing Committee, Co-Chairperson

WELCOME STATEMENT FROM THE ORGANIZING COMMITTEE CO-CHAIRPERSON

On behalf of the Conference Organizing Committee, I would like to welcome you to the International Symposium on Optical Memory 2014 (ISOM'14).

Taiwan was very much honored to be the first host of ISOM outside Japan in 2001, when the conference ended successful and memorable. The purpose of the symposium is to provide a forum for information exchange on a broad range of topics covering science and technology in optical memories.

ISOM'14 will be held from Oct. 20th to 23rd 2014 at Lakeshore Hotel in Hsinchu City, Taiwan. Hsinchu City is the most high-tech industry cluster in Taiwan. The Hsinchu Science Park, close to the symposium site, is very famous in the worldwide. Located in northwestern Taiwan, Hsinchu City is surrounded by mountains on three sides and the sea on the other, creating a funnel-shaped terrain. Consequently, when the monsoon wind comes from the northeast or southwest, it picks up speed as soon as it enters the city-whence the nickname "Windy City."

In 2014, it will be very expected to discuss the current status of information system, optical memory technologies, together with new development in the areas of media, lasers, basic theory including computer simulation, optical storage system, sub-components and future technologies.

黃得瑞

Der-Ray Huang
ISOM'14 Organizing Committee, Co-Chairperson

INTRODUCTION

The 24th International Symposium on Optical Memory (ISOM) will be held from October 20 to October 23, 2014, at Lakeshore Hotel in Hsinchu City, Taiwan.

The origin of ISOM is SOM (Symposium on Optical Memory), which was held firstly in 1985 in Tokyo as a Japanese domestic conference. The first ISOM was held in 1987 also in Tokyo. The ISOM or SOM has been held every year since 1985 and the total number of papers has reached 3,036. Total participants all through from the past were counted to be 9,790. Hopefully, it might exceed 10,000 at this year's conference.

The purpose of the symposium is to provide a forum for information exchange on a broad range of topics covering science and technology in optical memories and their related fields. However, information explosion in the inter-net and the cloud network enforces optical memories to change from those for consumer contents to those further for enterprise storage. Many colleagues of us are seeking for new frontier of optical memory technologies. In line of these situations, we discussed bio and image sensing applications as well as legitimate optical memories for archival use in 2013.

In 2014, enhancing these direction, it will be very expected to discuss the current status of information system, optical memory technologies, together with new development in the areas of media, lasers, basic theory including computer simulation, optical storage system, sub-components and future technologies.

As in the program, we have made the session schedule rather compact than last ISOM for effectiveness and easier attendance. Technical tour will be held the day after final session day. Your feedbacks would be very much appreciated for our future ISOM.

SCOPE OF THE SYMPOSIUM

ISOM'14 will discuss the current status of Information System, Optical Technology and Memory Technology, together with new developments in the areas of media, lasers, basic theory including computer simulation, system sub-components, and a range of future technologies.

From ISOM'09, the scope of the symposium was extended to accept a wide range of researches and technologies on optical memory systems.

From ISOM'10, the field of the symposium was newly introduced to discuss various technologies related to optical memory systems and storage systems.

From ISOM'13, the new scope of medical and bio optical technologies, from ISOM'14, the new scope of image sensing technologies are introduced as an extended scope in the field of optical technologies combined with signal processing.

In addition to ordinary contributed papers, a number of invited papers in cutting edge will be presented. In ISOM'14, Special Sessions of three specialized fields are also planned. The first one is focused on "Nano-Photonics", the second one is focused on "Optical/Photonic Interconnect", and the last one is a Taiwan Special Session. Distinguished researchers on each field will be invited to introduce their recent progress.

Topics to be covered in this symposium include, but are not restricted to:

Scope from a Technical Standpoint

1. Basic Theory and Physical Optics
・ Phase Change Physics
・ Photochemical Reaction
・ Multi-Photon Process
・ Electromagnetic Optics
・ Nonlinear Optics
・ Near-Field Optics
・ Quantum Optics
・ Spectroscopy
・ Simulation

2. Media and Material Science
・ Rewritable, Write-Once, Read-Only Media
・ Characterization, Recording and Readout Mechanisms
・ Manufacturing Technology

- ・Substrates, Mastering
- ・Super-Resolution Media
- ・Photochromic and Photorefractive Materials, Other Materials
- ・Photonic Crystals
- ・Plasmonics, Metamaterials, Nanomaterials

3. Drive Technologies and Signal Processing
- ・Drive Integration
- ・Mechanics and Electronics Design
- ・Servo and Accessing Methods
- ・Read/Write Channels, Error Correction
- ・Modulation Code
- ・Copy Protection
- ・Image Processing

4. Components and Nano-Fabrication
- ・Optical Heads, Actuators
- ・Lenses, Diffractive Optics
- ・Active or Adaptive Optics
- ・Light Sources, Detectors
- ・Integrated Optical Heads and Components
- ・Modulators, Image Sensors
- ・Photonic Devices
- ・MEMS/NEMS Fabrication and Devices
- ・Nano-Imprint

5. Testing Methods and Devices
- ・Testing and Evaluation Methods for Drives, Media and components
- ・Drive Testers, Media Testers

6. Optical Memory Systems
- ・Optical Storage Systems
- ・Digital Archival Systems
- ・Security Systems
- ・Mobile Systems

7. High-Density Recording
- ・Holography
- ・Volumetric Storage, Multi-layer Recording
- ・Scanning Probe and Near-Field Recording
- ・Multi-Level Recording
- ・Hybrid Recording
- ・New Magnetooptical Recording

8. Medical and Bio Optics Technologies
- ・Medical and Bio Systems
- ・Bio-chemical Sensing
- ・Bio-Lab on a Disc
- ・Medical and Bio-Optics

9. Image Sensing Technologies
- ・Computational Photography
- ・Expanded Depth of Focus
- ・Multi-view Camera
- ・Digital Holography
- ・Re-focusing Technologies

10. New World-Other Future Science and Technology
- ・Available to Information Storage
- ・New Applications Related to Optical Storage Technologies
- ・New Applications Related to Memory Technologies

Fields from a Practical Standpoint

A. Information System
- ・Archives
- ・Green IT
- ・Ecology
- ・New Concept

B. Optical Technology
- ・Components
- ・Material
- ・Display
- ・Apparatus
- ・Optical Sensing
- ・Imaging Camera

C. Memory Technology
- ・HDD
- ・SSD
- ・PCRAM
- ・Signal Processing

REGISTRATION FEES

All participants (including speakers) are requested to register, and are encouraged to register in advance (by **September 20, 2014**) in order to receive the early registration discount.

I. Pre-registration

The Symposium registration information and forms can be obtained from ISOM'14 website: (http://www.isom.jp). If you have any questions, please contact ISOM'14 secretariat office.

II. Onsite Registration

The registration desk will be located at the B1 floor of the Leith Castle, Apollo hall from Monday through Thursday during the following hours.

> Oct. 20: 15:00 - 17:20
> Oct. 21: 08:30 - 13:00
> Oct. 22: 08:30 - 13:00
> Oct. 23: 08:30 - 12:00

Type	Before / On September 20, 2014	After September 20, 2014
Regular	NTD 14,300	NTD 17,000
Student & Retiree	NTD 4,300	NTD 5,500
Banquet	NTD 1,200	NTD 1,500
Additional Technical Digest	NTD 1,000	NTD 1,000
Each Tutorial Course	NTD 3,000	NTD 3,500

* Registration fees are including 3days lunch.

The registration fee for the symposium includes admission to all the technical sessions and a copy of the Technical Digest. Students are asked for showing their ID cards.

III. Registration and Payment

Those who wish to attend ISOM'14 should register on the web (http://www.isom.jp/) after about August, 2014. The deadline for advanced registration is **September 20, 2014**. After that, the registration will be processed at the symposium site upon arrival.

Payment should be made in New Taiwan Dollar by bank draft or by bank transfer or credit cards (JCB, VISA and Master Card) payable to ISOM'14. No personal checks will be accepted.

IV. Refund Policy

The cancellation fee amounted NTD 1,500 will be deducted from the refund. Cancellations should be made in writing to the Secretariat. No cancellation will be admitted after October 15, 2014.

INSTRUCTION FOR SPEAKERS

ORAL PRESENTATION

▶ Time assigned for

Type	Total	Presentation	Discussion
Keynote	30 min.	30 min.	---
Invited	25 min.	20 min.	5 min.
Contributed	20 min.	15 min.	5 min.

▶ All speakers are requested to get in touch with their presiders 15 minutes before their sessions start.

▶ The conference room will contain an LCD projector, a laptop, a podium microphone, a screen and a laser pointer. Speakers may use their own laptop.

▶ If speakers use their own laptop, they will be requested to confirm its connection with the projector in the conference room during break time or in the morning. We recommend all speakers to have this check the day before their presentations.

▶ If speakers don't use their own laptop, they are requested to upload their presentation materials in a USB memory at the podium at least one hour prior to their presentations. We recommend the speakers to use PDF files in order to prevent file format or version troubles.

▶ We recommend all speakers to use more than 16-point font. The audience expects well-prepared presentations with clearly visible figures and captions, as well as good conclusion.

POSTER PRESENTATION

▶ Your session code will be indicated on the panel board. You will be provided with the material to mount your poster onto the board.

▶ Each author is provided with a 200 cm high x 100 cm wide poster space on which a summary of the paper is to be displayed.

- ‣ All authors are requested to affix their posters on the day of the poster session. Posters are to be removed immediately after the session ends.

- ‣ Authors must remain in the vicinity of the poster board at least for the duration of the assigned session (1 hour 30 min.). The absence of authors during the assigned session is treated as "CANCELLED". The session presiders will check all authors during the assigned session time.

- ‣ Any papers which are not presented during the Oral or Poster session will be regarded as "CANCELLED".

POST-DEADLINE PAPERS

A limited number of papers will be accepted for presentation of significant results obtained after the deadline. A delegated author has to fill in the paper submission form including a 35-word abstract following the instruction for submission at the ISOM website (http://www.isom.jp/), and then a 2-page PDF summary should be submitted through the website.

The ISOM web submission system does not accept any PDF file including 2-byte characters (for example, Japanese, Chinese and Korean characters). The local fonts should be removed from the text body and figures before submission.

Submission website is open from August 1 to September 1, 2014. The best four post-deadline papers are allowed as oral presentations in the final session. Other post-deadline papers (but limited numbers) will be presented in the poster session. Authors will be notified by the middle of September, 2014 whether their papers are accepted.

・ Time assigned for:

| Type	Total	Presentation	Discussion
Post deadline	15 min.	12 min.	3 min.

PUBLICATION OF SYMPOSIUM PAPERS

Technical Digest will be available at the symposium including invited papers, accepted contributed papers, and limited numbers of post deadline papers. DVD-ROM including the same contents as Technical Digest will be also published. The conference papers will be published in September 2015 as a special issue of the Japanese Journal of Applied Physics (JJAP), which is the English-language journal of the Japan Society of Applied Physics

(JSAP). The authors who will have, by themselves, presented papers at ISOM'14 will be allowed and strongly encouraged to submit their papers for publication in this special issue. The authors will be requested to submit a manuscript, an agreement form for copyright transfer and payment of publication charge to JSAP.

The instructions for preparation of manuscript and the agreement form for the special issue will appear on the ISOM website after the conference. The deadline for submission of manuscripts is January 20, 2015. Submitted papers will be reviewed based on the JJAP standard.

ATTENTION

It is not allowed to take a picture and video of any presentation materials in ISOM'14.

| **No Photo** | **No Video** | **No Recorder** |
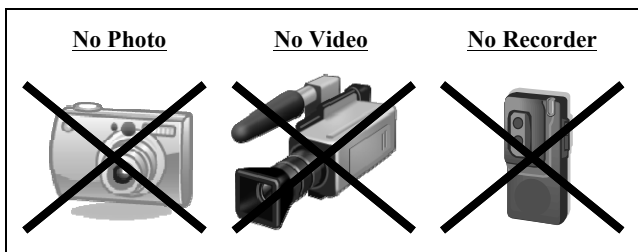
SPECIAL PROGRAM

I. TUTORIAL SEMINARS

The Tutorial Seminars (T-1, 2, 3) are offered on the first day of the conference and are targeted to expand your knowledge with technical information on the current state of research and developments in optical memories.

Pre-registration using the online registration form can be done together with the conference registration. The procedures for conference registration are available on the ISOM website (http://www.isom.jp/). On-site registration is only available subjected to the vacancies. You are advised to pre-register due to limited class size.

・ Date & Time: October 20, 13:00-18:00
・ Place: Leith Castle "Apollo I" at Lakeshore Hotel

- Fee: NTD 3,000 One seminar

  NTD 5,000 Two seminars

  NTD 6,500 Three seminars
- Language: English

Program:

T-1 13:00-14:20

Plasmonics and Its Applications to Optical Data Storage

Prof. Din Ping Tsai (Nat'l Taiwan Univ. and Academia Sinica, Taiwan)

Abstract: Tutorial of basic properties of plasmons, and its applications to optical data storage. Principle of plasmons and localized plasmons will be addressed. Advanced applications of plasmonics on the optical data storage will be reviewed.

Instructor Biography: Din Ping Tsai (PhD., Univ. of Cincinnati, USA, 1990) is Professor of National Taiwan University and Director of Research Center for Applied Sciences, Academia Sinica, Taiwan. He is Fellow of APS, APAM, EMA, IEEE, OSA, SPIE, Physics Society of ROC, and President of Taiwan Photonics Society (TPS) (2014-2016).

14:20-14:50 Break

T-2 14:50-16:10

Holographic Mass-Storage System and Polarization Holography

Prof. Toyohiko Yatagai (Center for Optical Research and Education, Utsunomiya University, Japan)

Abstract: Holographic data storage systems will be discussed in terms of optical architectures and materials. Especially, polarization holographic techniques and polarization sensitive photopolymers are introduced. Angular and shift multiplexing techniques, as well as polarization multiplexing, are discussed.

Instructor Biography: Prof. Toyohiko Yatagai received degrees of engineering from University of Tokyo. He worked in Riken, Institute of Physical and Chemical research and then moved to University of Tsukuba. He is now the Director of Center for Optical Research and Education, Utsunomiya University. He is Fellow of SPIE, OSA and JSAP. He will be 2015 President of SPIE.

16:10-16:40 Break

T-3 16:40-18:00

Exploring bioinspired intelligent memory based on nano-optical technologies

Prof. Toshiharu Saiki (Keio University, Japan)

Abstract: The current status and perspective of high-density data storage based on nano-optical techniques will be reviewed. As a new direction of advanced optical storage technology, the possibility to create bioinspired intelligent memory with data processing functionality will be discussed.

Instructor Biography: Toshiharu Saiki received his Ph.D degree in applied physics from the University of Tokyo. In 1993, he joined the Kanagawa Academy of Science and Technology, where he later became a project leader. He had been an Associate Professor at Keio University since 2002 and Professor since 2009.

II. EXHIBITION

Limited exhibition space will be available during ISOM'14. Optical storage and related products, equipments, etc. are welcome to exhibit with fee. Space allocations will be on first come first served based. Please contact Ms. Sophia Liu at e-mail: tisa@tisa-tw.org.tw for details.

▸ Date & Time: Tuesday, Oct. 21   10:00-18:00

                Wednesday, Oct. 22   10:00-18:00

                Thursday, Oct. 23   10:00-14:00

▸ Place: Lakeshore Hotel, B1 Lobby, Leith Castle

III. SOCIAL PROGRAM

Get Together Reception

- Date & Time: Monday, October 20   18:30-
- Place: Lakeshore Hotel, Versailles, Leith Castle
- Fee: No charge

All attendees including spouses are invited to the Get Together Reception.

Banquet Reception

- Date & Time: Wednesday, October 22 18:30-
- Place: Lakeshore Hotel, Versailles, Leith Castle
- Fee: Advance registration NTD 1,200
    Onsite registration NTD 1,500

Ticket for the Banquet Recption is not included in the registration fee. Application for Banquet can be made online.

IV. TECHNICAL TOUR

- Date & Time: Friday, October 24, 8:30-16:00
- Place: ITRI (Industrial Technology Research Institute)
     HSPB (Hsinchu Science Park Bureau)
     Fuxing Tea Factory
- Fee: NTD 1,200 (30 attendees limited, fee is including lunch.)

Application for Technical Tour can be made online or onsite by cash.

ISOM'14 Secretariat

Taiwan Information Storage Association (TISA)

Tzuan-Ren Jeng (Secretary General)

Sophia Liu (Secretary)

Kathy Yen (Secretary)

- Tel: 886-3-5679742 / Fax: 886-3-5679742
- E-mail: tisa@tisa-tw.org.tw
- Add: Room 913, Bldg.51, 195, Sec.4, Chung Hsing Rd, Chutung, Hsinchu 310, Taiwan

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- Add: c/o Adthree Publishing Co., Ltd.
     27-37, Higashinakano 4-chome,
     Nakano-ku, Tokyo 164-0003, Japan

TECHNICAL PROGRAM

October 21, 2014 (Tuesday)

Tu-A: Opening & Keynote

Presider: Minoru Takeda (Kyoto Inst. of Tech., Japan)

Tu-A-01

09:00 Opening Remarks

Yoshimasa Kawata (Shizuoka Univ., Japan)

Organizing Committee Co-Chairperson

Din Ping Tsai (Academia Sinica, Taiwan)

Technical Program Committee Co-Chairperson

Tu-A-02 Keynote

09:15 Development of Optical Data Storage Industry in Taiwan

Der-Ray Huang[1], Tzuan-Ren Jeng[2] and Chuan-Yuan Chung[2]

[1]Nat'l Dong-Hwa Univ., [2]Industrial Tech. Res. Inst. (Taiwan)

The optical data storage industry in Taiwan was blooming in early 1990s'. Within 10 years, several Taiwan companies had become the major suppliers of optical discs and drives in the world. In this paper, we will analyze the developed process and current status of optical storage industry in Taiwan.

Tu-B: High Density Recording

Presiders: Masahisa Shinoda (Mitsubishi, Japan)

Takaya Tanabe (Ibaraki Nat'l College of Tech., Japan)

Tu-B-01

09:45 Low-Cost Ultra-High Areal Density Optical Disc System Towards 400 GB/disc

Yoshitaka Morimoto[1], Takahiro Kurokawa[1], Atsushi Kikukawa[1], Koichi Watanabe[1], Zenjiro Chiba[2], Hideharu Takeshima[3], Isao Matsuda[4], Shinichi Kojo[4], Kenichi Shimomai[4], Toru Fujii[4]

[1]Central Research Laboratory, Hitachi, Ltd., [2]Mitsubishi Chemical Corporation, [3]Mitsubishi Kagaku Media Co., Ltd., [4]Taiyo Yuden Co., Ltd. (Japan)

We introduce a new 400GB disc system having double recording density of BDXLTM. Here, we studied

land-groove geometry, code modulations with minimum run-length greater than 3, and groove address with minimum influence on read/write performance.

Tu-B-02

10:05 Decoupling Direct Tracking Control for Multilayer Disk with a Separated Guide Layer

Yukinobu Tanaka, Takeshi Ogata, Seiji Imagawa
Hitachi, Ltd (Japan)

We developed the tracking control method named "decoupling direct tracking control method" corresponding to the multilayer disk with a separated guide layer. And we confirmed its effectiveness against some disturbances such as disk tilt or half sine shock pulse.

Tu-B-03

10:25 Multilayer Optical Disc Structure with Transparent Gas-Containing Layer

Kenichi Shimomai, Junji Oshita, Sho Asano, Isao Matsuda, Shinichi Kojo, Wakaaki Murai, Masashi Hattori, Atsuo Shimizu, Toru Fujii
TAIYO YUDEN CO., LTD. (Japan)

We propose the design and the recording mechanism of a multilayer optical disc with a stacked structure containing a light-absorbing layer and an optically transparent gas-containing layer.

Tu-B-04

10:45 Channel-Model-Assisted Development and Optimization of an InSb-Based Super-Resolution Optical Storage and Archiving System

Dietmar Hepper
Deutsche Thomson OHG (Germany)

Methods of optical channel characterization and signal-based optical channel modeling for an InSb-based super-resolution optical disc system are presented that facilitate optical disc and drive development, and help reducing development cost.

Tu-B-05

11:05 Detuned Surface Plasmon Resonance Polarization Readout for Multilayered Optical Storage Based On Plasmonic Nanorods

Adam B. Taylor, Pierrette Michaux, James W. M. Chon
Swinburne University of Technology (Australia)

In this paper, we demonstrate detuned SPR polarization readout on multilayered gold nanorod films, in which

the alignment of gold nanorods is produced by two independent techniques. This proof-of-concept experimental result will demonstrate the usefulness of detuned polarization readout method in the future multilayered optical storage media, based on gold nanorods or on any anisotropic recording materials.

11:25-11:45 Break

<u>Tu-C: Medical and Bio Optics Technologies</u>

Presiders: Makoto Itonaga (JVC-Kenwood, Japan)
Minoru Takeda (Kyoto Inst. of Tech., Japan)

Tu-C-01 Invited

11:45 Pros and Cons of a Position-Addressable Point Laser Scanning Fluorescence Microscopy Based on an Optical Disk Pickup Head

Rung-Ywan Tsai, Jung-Po Chen, Hung-Chih Chiang, Yuan-Chin Lee, Chun-Chieh Huang, Chih-Ming Cheng, Tai-Ting Huang, Chung-Ta Cheng, Golden Tiao
Industrial Tech. Res. Inst. (Taiwan)

A position-addressable point laser scanning fluorescence microscope (LCFM) is designed and developed with a commercially optical pickup head (PUH). Pros and cons of the LCFM for the cell fluorescence image capturing are investigated and discussed.

Tu-C-02 Invited

12:10 Detection of Microorganisms in Water Using Optical Disk and Image Recognition Technologies

Takayuki Shima, Makoto Fujimaki, Koichi Awazu, Hirokazu Nosato, Hidenori Sakanashi, Eiichi Takahashi, Masahiro Murakawa, Yoriko Sonoda, Masatoshi Kanesato
AIST (Japan)

To meet the demand for rapid detection of pathogenic microorganisms such as Escherichia coli in water, we have developed a system rebuilding an image of the microorganisms by scanning grooves of the disk substrate.

12:35-13:55 Lunch

Tu-D: Nano Photonics 1 (Special)

Presiders: D. P. Tsai (Academia Sinica, Taiwan)
Ryuichi Katayama (Fukuoka Inst. of Tech., Japan)

Tu-D-01 Invited

13:55 Plasmonic Lithography Using an Active Nanogap-Controlled Solid Immersion Lens-Based Plasmonic Optical Head with a Sharp-Ridged Aperture

Won-Sup Lee, Taeseob Kim, Guk-Jong Choi, Geon Lim, Hyungbae Moon, Do-Hyung Kim, Sungbin Jeon, Young-Pil Park, No-Cheol Park
Yonsei Univ. (Korea)

As an application of the solid immersion lens (SIL)-based near field recording technology, a noncontact plasmonic lithography with a nanoaperture at the bottom surface of a SIL is introduced to achieve a few tens nanometer pattern size.

Tu-D-02 Invited

14:20 New Developments of Atom-Photonics with Evanescent Light and Near-Field Light

Haruhiko Ito, Kenta Sagawa, Takahiro Yoshida
Tokyo Inst. of Tech. (Japan)

We describe atom control techniques with evanescent lights and near-field lights developed or now being developed, including atom deflector, atom detector, and atom funnel. The feasibility of spin-cluster generation is also discussed.

Tu-D-03 Invited

14:45 Fluorecence Enhancement with Surface Plasmon Excitation in Deep Ultraviolet Light

Yoshimasa Kawata, Masazazu Kikawada, Atsushi Ono, Wataru Inami
Shizuoka Univ. (Japan)

We have demonstrated the enhancement of fluorescence excitation with surface plasmon (SPR) in deep ultraviolet region. Aluminum thin film was used for the excitation of SPR. Multicolor imaging of HeLa cells was demonstrated.

15:10-15:30 Break

Presiders: No-Cheol Park (Yonsei Univ., Korea)
Nobuhiro Kinoshita (NHK, Japan)

Tu-E-01 Invited

15:30 Coaxial Holographic Memory with Spatially Modulated Lightwaves

Takanori Nomura, Yusuke Saita
Wakayama Univ. (Japan)

The method to design the reference pattern the input phase pattern to improve the performance of holographic memory is presented. Some numerical experiments based on a coaxial holographic memory are given to confirm the method.

Tu-E-02

15:55 Influence of the Spatial Frequency Dependence of the Recording Materials in the Temporal Coding Holographic Memory

Tsutomu Shimura
The University of Tokyo (Japan)

Effects of the dependence of the response of the recording materials on the spatial frequencies of the fringes in temporal coding co-axial holographic memory are investigated. Numerical simulations show good agreement with the experimental results.

Tu-E-03

16:15 Shift Multiplexing with Uncorrelated Computer -Generated Reference Patterns in Coaxial Holographic Storage

Teruyoshi Nobukawa, Takanori Nomura
Wakayama University (Japan)

Shift multiplexing with uncorrelated computer -generated reference patterns is proposed. With the proposed method, the cross talk from adjacent holograms is suppressed, and light efficiency and/or a signal-to-noise ratio are improved.

Tu-E-04

16:35 Phase Gradient Coding and its Detection Method for Holographic Data Storage

Yusuke Saita, Takanori Nomura
Wakayama University (Japan)

The phase gradient coding and its detection method are proposed as an alternative method to record multilevel data. The proposed method can be expected to obtain

phase modulated data without a complicated configuration.

Tu-E-05

16:55 Phase Encoding Based on Quaternary in Holographic Data Storage

Ke Xu, Xiao Lin, Yabin Cheng, Xiaodi Tan
Beijing Institute of Technology (P.R.China)

In a holographic storage system, we must first complete the conversion between user data and page data. In this paper, a phase encoding based on quaternary method, which used for holographic data storage, is discussed.

October 22, 2014 (Wednesday)

We-F: Media and Material Science

Presiders: Kimihiro Saito (Sony, Japan)

Eriko Watanabe (The Univ. of Electro-Communications, Japan)

We-F-01 Invited

08:30 **Nonlinear manipulation induced super-resolution optical field and applications in nano-data storage**

Jingsong Wei, Yiqun Wu, Yang Wang, Fuxi Gan

Shanghai Inst. of Optics and Fine Mechanics, Chinese Academy of Sciences (China)

We give nonlinear manipulation induced super resolution optical fields, and the applications in high density optical information storage and super-resolution nanolithography are also presented.

We-F-02 Invited

08:55 **Photo-induced Picosecond Lattice Deformation in $Ge_2Sb_2Te_5$**

Tomoya Kawaguchi[1], Kazuya Tokuda[1], Tetsu Ichitsubo[1], Toshiyuki Matsunaga[2], Noboru Yamada[1], Eiichiro Matsubara[1]

[1]Kyoto Univ., [2]Panasonic (Japan)

Photo-induced picosecond lattice deformation observed by the x-ray free-electron laser at SACLA reveals an ultrafast precursor phenomenon of the phase change process in $Ge_2Sb_2Te_5$

We-F-03

09:20 **Time-Resolved Phase-Change Recording Mark Formation with Zinc Oxide Near-Field Optical Active Layer**

Tsung Sheng Kao[1], Wei-Lun Hsu[2], Wei-Yi Tsai[3], Din Ping Tsai[2,3]

[1]National Chiao Tung University, [2]National Taiwan University, [3]Research Center for Applied Sciences, Academia Sinica (R.O.C.)

The optical responses and time evolution of phase-change recording marks formation with a ZnOx nanostructured thin film will be investigated, exploring the writing and reading mechanism of using ZnOx nano-composites as the optical active layer.

Presiders: D. R. Huang (Nat'l Dong Hwa Univ., Taiwan)
C. H. Tien (Nat'l Chiao Tung Univ., Taiwan)

We-G-01 Invited

09:40   High Resolution LCOS for Holographic Storage and 3D Display Applications

Kenneth Tai, Ray Kuo
InveStar Corporation (Taiwan)

Holographic data storage (HDS) has been invested by decades. Recently research based on phase SLM and new recording material can improve the capacity and data transfer rate for the future cloud computing system applications.

We-G-02 Invited

10:05   Simulation of Holographic Data Storage System with VOHIL Calculation Model

Yeh-Wei Yu, Ching - Cherng Sun
Nat'l Central Univ. (Taiwan)

VOHIL theorem is simpler and more effective than other models. The analytic solutions of storage system derived from VOHIL calculation model make the physical concept clear. Accordingly, optimized solutions for holographic storage system are proposed.

We-G-03 Invited

10:30   Toward Compact and Low Cost Optical Resolution Photoacoustic Microscope Using a Blu-ray Disc Pickup Head

Meng-Lin Li
Nat'l Tsing Hua Univ. (Taiwan)

I will present a proposed Blu-ray disc (BD) pickup head based optical resolution photoacoustic microscopy (OR-PAM) system for label-free micro-vascular and un-stained blood smear imaging, which potentially can be a compact and low-cost OR-PAM platform.

10:55-11:15   Break

We-H: Nano Photonics 2 (Special)

Presiders: Yoshimasa Kawata (Shizuoka Univ., Japan)
Minoru Takeda (Kyoto Inst. of Tech., Japan)

We-H-01 Invited

11:15 **High Efficiency Optical Nano-focusing for Optical Storage**

Haifeng Wang, Songlin Zhuang
Ministry of Education and Shanghai Key Lab of Modern Optical Systems (China)

We investigated different solutions to the focusing of laser beams toward achieving sub 100nm beam spot with high efficiency. This target is fulfilled by combination of a Plasmonic antenna with longitudinally polarized light.

We-H-02 Invited

11:40 **Plasmonics in Organic Light-Emitting Diodes and Organic Thin-Film Solar Cells**

Takayuki Okamoto
RIKEN (Japan)

I present applications of plasmonics to improving light extraction efficiency in organic light-emitting diodes and replacement of the indium-tin-oxide transparent electrodes by silver thin films with randomly arranged nanoholes in organic thin-film solar cells.

We-H-03 Invited

12:05 **Brain-Inspired Memory Based on Plasmon Particle Network with Phase Change Material**

Takashi Hira, Kenta Kuwamura, Yuya Kihara, Yusuke Hirukawa, Toshiharu Saiki
Keio Univ. (Japan)

We demonstrated all-optical switching of localized surface plasmon resonance of single Au nanoparticles on a GeSbTe film. We explore the possibility of new intelligent memory functionality based on a plasmon particle network system.

12:30-12:45 ISOM'15 Announcement & Photo

12:45-14:05 Lunch

Presiders: Takeshi Shimano (Hitachi, Japan)
                  Kazuo Watabe (Toshiba, Japan)

We-I-01 Invited

14:05 Multi-Point And Multi-Aperture Time-Resolving CMOS Image Sensors

Keiichiro Kagawa, Keita Yasutomi, Shoji Kawahito
Shizuoka Univ. (Japan)

Based on a time-resolving pixel structure or the complete pixel parallel readout scheme, high-speed low-noise CMOS image sensors for microscopy have been developed. Multi-aperture optics with a dedicated CMOS image sensor for ultra-high-speed image acquisition is also shown.

We-I-02 Invited

14:30 Parallel Phase-Shifting Digital Holography and Its Application to 3D Imaging of High-Speed Phenomena

Yasuhiro Awatsuji[1], Takashi Kakue[1], Tatsuki Tahara[1], Peng Xia[1], Kenzo Nishio[1], Shogo Ura[1], Osamu Matoba[2]
[1] Kyoto Inst. of Tech. [2] Kobe Univ. (Japan)

Parallel phase-shifting digital holography carries out phase-shifting interferometry with single-shot exposure and is capable of 3D measurement of object. 3D imaging at the rate of up to 262,500 frames/s has been demonstrated by the system.

We-I-03 Invited

14:55 Aberration Controlled Imaging for Extended Depth of Field

Taro Sawaki, Ryosuke Kasahara, Hiroyuki Sato
RICOH (Japan)

A combined optical-digital system can extend depth of field.We propose a novel design method of aberration controlled optics and image processing.This method achieves both of extended depth of field and high-quality image.

We-I-04

15:20 Experimental Demonstration on Combination of Digital Holography and Fluorescence Microscopic System

Xiangyu Quan[1], Osamu Matoba[1], Kouichi Nitta[1], Yasuhiro Awatsuji[2]
[1]Kobe Univ., [2]Kyoto Insitute of Technology (Japan)

We propose the combination of digital holographic microscope and fluorescent microscope. In the preliminary experiment, the fluorescent image was obtained in the reflection-type configuration and the holographic image was obtained in the transmission-type configuration.

We-I-05

15:40 Rotationally Symmetric Wavefront Coding for Extended Depth of Focus with Annular Phase Mask

Mitsuhiko Ohta[1], Koichi Sakita[1], Takeshi Shimano[1], Akito Sakemoto

[1]Hitachi,Ltd., [2]Hitachi Maxell, Ltd. (Japan)

We replaced a cubic phase mask (CPM) in wavefront coding to a rotationally symmetric annular phase mask to avoid several intrinsic asymmetrical disadvantages. Comparable effect to CPM in extended depth of focus was observed successfully.

We-I-06

16:00 A New Technique in Digital Holographic Three-Dimensional Imaging Spectrometry

Kyu Yoshimori, Masaki Obara

Iwate University (Japan)

A new interferometric technique to obtain three-dimensional multi-spectral images of spatially incoherent, polychromatic source distributions is presented. This method is confirmed to have superior imaging characteristics in depth resolution in comparison with the previous methods.

16:20-16:40 Break

We-J: Poster Session (16:40-18:10)

Presiders: Minoru Takeda (Kyoto Inst. of Tech., Japan)
Makoto Itonaga (JVC-Kenwood, Japan)
Osamu Matoba (Kobe Univ., Japan)
Kazuo Watabe (Toshiba, Japan)

We-J-01

Enhancement of Near-Field Light Generated by Metal Nano-Dot on Semiconductor Substrate for HAMR Heat Source

Ryuichi Katayama[1], Takayuki Kasuya[2], Satoshi Sugiura[2], Katsumi Yoshizawa[3]

[1]Fukuoka Institute of Technology, [2]Pioneer Corporation, [3] Pioneer Micro Technology Corporation (Japan)

A numerical simulation showed that the near-field light can be enhanced by selecting suitable combinations of the materials for a metal nano-dot and a semiconductor substrate in a novel device for a HAMR heat source.

We-J-02

Diffraction Efficiency of Magnetophotonic Crystal Media in Volumetric Magnetic Holography

Ryosuke Isogai, Shota Suzuki, Kan Kobayashi, Taichi Goto, Hiroyuki Takagi, Yuichi Nakamura, Pang Boey Lim, Mitsuteru Inoue

Toyohashi University of Technology (Japan)

The diffraction efficiencies of magnetophotonic crystal media in volumetric magnetic holography were evaluated by numerical calculation. A large Faraday rotation angle and deep magnetic fringes resulted in a high diffraction efficiency.

We-J-03

Sputtered-Garnet-Ferrite-Film's Magneto-Optical Property Dependence on Initial Deposition Condition of Substrate

Akinori Furuya[1], Ai-ichiro Sasaki[1], Hiroki Morimura[1], Osamu Kagami[1], Takaya Tanabe[2]

[1]NTT Microsystem Integration Laboratories, [2]Ibaraki National College of Technology (Japan)

Sputtered Bi-substituted Dy iron garnet ferrite films were prepared by rf magnetron sputtering on a glass substrate covered with low-yield-point glass (LYG) as an initial underlayer. This garnet material with a large Faraday rotation has potential applications to, for example, optical devices, optical recording media, and optical network components. We previously reported that an LYG underlayer effectively suppresses crack formation in garnet film. When garnet film is cracked, its coercive force and vertical anisotropy are reduced. When crack formation is suppressed, the magneto-optical properties of garnet film are greatly improved.

In this study, we investigated the effect of the initial underlayer on changing the magneto-optical properties, and clarified the change mechanism.

We-J-04

Crystallization Behavior of $Ge_2Sb_2Te_5$ Thin Films Driven by Multi-Shot Femtosecond Laser Pulses

Qiusong Yang, Zhilong Cai, Huan Huang, Yang Wang, Yiqun Wu

Chinese Academy of Sciences (P.R.China)

Crystallization behavior of as-deposited amorphous $Ge_2Sb_2Te_5$ thin films induced by multiple femtosecond laser pulses is studied by real-time reflectivity measurements. The threshold effects of reflectivity contrasts, the number of pumping laser pulses and energy fluences are discussed with two temperature model calculations.

We-J-05

Recording Characteristics of GeCuTe Layers Prepared by Sputtering Process Utilizing GeCuTe Composite Target

Hung-Chuan Mai, Kun-Hung Hsieh

Solar Applied Materials Technology Corporation (R.O.C.)

The characteristics of GeCuTe films were investigated. In-situ Reflectivity/XRD characterization/TEM characterization revealed that Cu_2GeTe_3 crystallization is mainly recording mechanism. It has ultra-fast crystallization rate, suitable phase transition temperature and large modulation.

We-J-06

Effect of the Thickness of Si Layer on the Optical Properties, Microstructures and Recording Characteristics of Si/NiSi Bilayer

Sin-Liang Ou[1], Chong-Sian Wang[2], Sheng-Chi Chen[2], Yan-Cheng Lin[2], Tsung-Yen Kuo[1]

[1]National Taiwan University (R.O.C.), [2]Ming Chi University of Technology (R.O.C.)

Si/NiSi bilayers were prepared by sputtering as the recording films of write-once blue ray discs. It reveals the Si (1.5-3 nm)/NiSi (16 nm) films have more potential in blue laser recording media.

We-J-07

Optical Properties of Dyes Affected by Accelerating UV Light Exposure

Der-Ray Huang, Yi-An Chen, Run-Lin Liou, Jing-Xuan Lin

National Dong Hwa University (R.O.C.)

After UV light exposure for 20~50 hours, the intensities of main absorption peaks for optical recordable media are degraded obviously, while the intensities of main absorption peaks for dye sensitized solar cells are not degraded obviously.

We primarily use the information from the differential readout components generated by the superRENS effect, using a signal processing method based on a PRML (1,-1) decoding system. We have also evaluated this method experimentally.

We-J-12

Equally Scattered Interleaving for Holographic Data Storage Systems

Junghyun Park, Jaejin Lee
Soongsil University (Korea)

Holographic data storage (HDS) is a storage system with different mechanism from the conventional storage system such as DVD and HDD. HDS reads and writes data like a picture in a page. Thus, its access time is much faster than serially processed conventional storage systems. However, when reading data, the mutual interference between the adjacent data pixels, which is referred to as two-dimensional (2D) inter symbol interference (ISI), the scattering due to the defects within optical system, the fixed-pattern noise (FPN) on spatial light modulator (SLM), and charge coupled device (CCD) can cause 2D burst error problems. These errors are concentrated on a specific region, and 2D interleaving technique is very helpful to solve this problem. We propose a new interleaving scheme for HDS and compare the performance with other interleavers.

We-J-13

Iterative Detection for Holographic Data Storage

Dinh-Chi Nguyen, Jaejin Lee
Soongsil University (Korea)

In this paper, we propose a new model that two-dimensional (2D) soft output Viterbi algorithm (SOVA) is served by two extrinsic information resources, namely, from the 2D equalizers and the demodulator output. The results show that the proposed model improves the performance of HDS system even if it is considered the effect on all directions.

We-J-14

Intersymbol Interference Compensation for Holographic Data Storage

Seongkwon Jeong, Jaejin Lee
Soongsil University (Korea)

In holographic data storage (HDS) systems, data is recorded and read by page on a volume of storage

medium. This causes two-dimensional intersymbol interference (2D ISI). An OFF-pixel surrounded by ON-pixels can have a large read value which is decoded as an ON-pixel. To compensate the defect, in this paper, we propose ISI compensation method and simulate the performance.

We-J-15

Plasmonic Lens with Multi-Circular Slits for Improvement of Light Utilization Efficiency

Naoyuki Kimura[1], Minoru Takeda[1], Tsutomu Inoue[2], Kento Aizawa[2]

[1]Kyoto Institute of Technology, [2]JASCO Corporation (Japan)

We designed and fabricated a Plasmonic Lens (PL) with multi-circular slit apertures to improve light utilization efficiency. The light intensity remarkably increased more than twice compared to the conventional PL, and the focal spot with subwavelength size was also attained.

We-J-16

Fine Diffractive Optical Elements for Storage Usage

Shuhei Yoshida, Noriyuki Unno, Keito Ogino, Keiko Yamamoto, Jun Taniguchi, Manabu Yamamoto
Tokyo University of Science (Japan)

In this study, we have investigated the read only memory (ROM) type holographic data storage based on the diffractive optical element (DOE). We developed a trial model DOE using nanoimprint lithography technology. Moreover, we evaluated the possibility of multi-layered DOE with simulation.

We-J-17

Preparation and Properties of Carbon Nanofuses for Permanent Data Storage

Kevin Laughlin, Hao Wang, Barry M. Lunt, Robert C. Davis, Matthew R. Linford
Brigham Young University (U.S.A.)

Deposition methods have been developed for making prototypes of submicron structures for permanent digital data storage.

We-J-18

Development of an Optical Model, guided by AFM, for Arc-Deposited Carbon Thin Films in Solid State Data Storage Elements

Hao Wang, Kevin Laughlin, Jake Bagley, Barry M. Lunt, Robert C. Davis, Matthew R. Linford

Brigham Young University (U.S.A.)

An optical model, guided by AFM, has proved very effective in helping to develop a thin-film carbon fuse element for permanent solid-state data storage.

We-J-19

XPS and ToF-SIMS Analysis of the Information Storage Medium of a Permanent Write-Once-Read-Many (WORM) Archival, Solid State Data Storage Device

Hao Wang, Kevin Laughlin, Jake Bagley, Barry M. Lunt, Robert C. Davis, Matthew R. Linford
Brigham Young University (U.S.A.)

Analysis of thin carbon films for use in permanent solid-state storage has shown that there is a wide process window for making these films.

We-J-20

Exploring Sputtered Carbon for the Nanofuses in Solid-State Long-Term Digital Data Storage

Jacob D. Bagley, Hao Wang, Anubhav Diwan, Robert C. Davis, Barry M. Lunt, Matthew R. Linford
Brigham Young University (U.S.A.)

We have explored depositing carbon by sputtering, for making nanofuses for permanent digital data storage. Sputtered carbon does not result in a resistivity in the range that would be useful for this application.

We-J-21

Prototyping Permanent Data Storage Elements with Electron Beam Lithography

Kevin Laughlin, Hao Wang, Barry M. Lunt, Robert C. Davis, Matthew R. Linford
Brigham Young University (U.S.A.)

Electron beam lithography has been successfully used to develop prototype elements for permanent digital data storage, with submicron resolution and excellent flexibility.

We-J-22

Study of Statistical Analysis using Fisher Information for Life Expectancy

Mitsuru Irie[1,2], Toshio Suzuki[2], Takao Ihashi[2], Yoshinobu Mitsuhashi[2]
[1]Osaka Sangyo Univ., [2]ADTC (Japan)

In the era of digital big data, the optical disc technology be refocused on archiving solution for digital data information. This paper reports discussion of statistical

analysis using Fisher Information matrix for life expectancy based on the ISO/IEC 16963.

We-J-23

A Transverse Electro-Optic Probe System for Organic Photovoltaic Device

Yoko Yabe[1], Jun Katsuyama[1], Mitsuru Shinagawa[1], Hiroyuki Sugino[2]

[1]Hosei University, [2]Yokogawa Electric Corporation

An organic photovoltaic (OPV) device is a light and flexible solar battery and can be used in various situations [1], e.g., the windshield of a car, walls of a building, and clothes. The OPV device is produced by using a roll-to-roll production process, and its performance can be estimated by measuring the electric near fields over it. The electric field distribution of OPV device was reported with a noncontact type of electro-optic (EO) probe [1]. The EO probe was developed to measure GHz-band printed circuit boards [2]. It detects a longitudinal electric field, so it is difficult to improve sensitivity. It is well-known that the transverse type EO probe has a higher sensitivity than does the longitudinal one [3], [4].

We developed a transverse type EO probe for measuring the electric near field of the OPV device. In this paper, we describe the configuration of this novel probe, performance, and experimental results.

We-J-24

High Speed BSDF Measurement for Holographic Data Storage System

Che-Chu Lin, Yeh-Wei Yu, Ching-Cherng Sun
National Central University (R.O.C.)

In this paper, we build a bidirectional scattering distribution function (BSDF) measuring device to detect the scattering distribution of the medium. It will be a good benefit to analyze the recording medium.

We-J-25

Complex Amplitude Acquisition for Holographic Data Storage

Chungin Jung[1,2], Nakyeong Kim[2], Sung-Yong Lim[1], Do-Hyung Kim[1], Sungbin Jeon[1], Hyunseok Yang[1]
[1]Yonsei University, [2]LG Electronics (Korea)

In Holographic data storage, when read the data, the main goal is to reconstruct original data without any leaking data. So, various methods and many research has been tried for the quality improvement of amplitude

data get from detector. But research object has been limited to get only amplitude data.

In this paper, we propose complex plane propagation (CPP) method for holographic data storage. Using this method, amplitude and phase information of data pages can be reconstructed and it can compensate various misalignments without additional equipment.

We-J-26

Intelligent Complex Distortion-detection Algorithm for Data Restoration in a Holographic Data Storage System

Wooyoung Jeong, Jang Hyun Kim, Sung-Yong Lim, Jae-Seong Lee, Inho Kim, Hyunseok Yang
Yonsei University (Korea)

Holographic Data Storage System (HDSS) is volumetric data storage that stores several 2D data pages with lots of rows and columns with multiplexing method. HDSS consists of optical components. HDSS is vulnerable to misalignment of optical components. Misalignment of optical components could generate image distortions: barrel, pincushion, rotation. These data distortions prevent HDSS from reconstructing stored data accurately. Compensating optical distortion is important. Parameters that means how much images are distorted should be known for compensating image distortion. In this paper, we proposed intelligent complex distortion-detection algorithm for restoring data in HDSS. Proposed algorithm consists of fuzzy system using subtractive clustering method and could detect how much the data image has rotation, barrel and pincushion. With proposed algorithm, distortion parameter for compensation could be acquired.

We-J-27

Image Compensation using Wavelet Transform for tilt servo control in Holographic Data Storage System

Jang Hyun Kim, Wooyoung Jeong, Hyunseok Yang
Yonsei University (Korea)

In this paper, we simulate and experiment servo control system by fuzzy system in our Holographic Data Storage System. Also, we used wavelet transform filter in order to obtain more exact image pattern for tilt servo control in Holographic Data Storage system. Hence, we acquire good experimental results and performance for tilt servo control in Holographic Data Storage System.

We-J-28

Over-1000-Hologram Recording in Angle and Peristrophic Multiplexing Holographic Memory

Masamitsu Sawada[1], Nobuhiro Kinoshita[2], Tetsuhiko Muroi[2], Mitsuya Motohashi[1], Nobuo Saito[2]
[1]Tokyo Denki University, [2]NHK (Japan)

We describe the rotation spacing dependency on both the numerical aperture of lens and reference light angle. Furthermore, we show the bit-error rate characteristics in 1035 holograms recorded by using angle and peristrophic multiplexing.

We-J-29

Super-Resolution Holographic Data Storage Without Recording a Zero-Order Beam

Teruyoshi Nobukawa, Takanori Nomura
Wakayama University (Japan)

Super-resolution holographic data storage is proposed. The proposed method makes it possible to record and retrieve data pages with a smaller aperture than a Nyquist aperture. Numerical experiments confirmed the feasibility of the proposed method.

We-J-30

Bit Error Rate of Layered Recording in Reflection-type Holographic Memory using Three-dimensional Shift Multiplexing

Tatsuya Nishizaki, Kouichi Nitta, Osamu Matoba
Kobe Univ. (Japan)

Bit error rate (bER) of three-dimensional speckle-shift multiplexing using 3:16 coding in the reflection-type holographic memory is evaluated. Numerical results indicated that three-layer recording reduced bER by 91.4 % compared with that of single-layer recording.

We-J-31

Examination of maximum multiplexing number using shift-peristrophic recording method

Hiroyuki Kurata, Keiko Yamamoto, Yu Tsukamoto, Jun Mori, Shuhei Yoshida, Manabu Yamamoto
Tokyo University of Science (Japan)

In this paper, we propose a shift-pperistrophic multiplexing technique that uses spherical reference waves, and experimentally verify that this method efficiently increases the data capacity. In the proposed method, a series of holograms is recorded with shift multiplexing, in which the recording material is rotated

with its axis perpendicular to the material's surface. By iterating this procedure, multiplicity is shown to improve. This method achieves more than 3600 multiplexing recording. A capacity increase of several TB per disk is expected by maximizing the recording medium performance.

We-J-32

Improvement the Capacity and the SNR in the Collinear Holographic Data Storage System

Chih-Yuan Cheng, Yeh-Wei Yu, Ching-Cherng Sun
National Central University (R.O.C.)

In this paper, we enhance the storage capacity by piston light value technique and the SNR by homodyne detection technique. According to the simulation results, the capacity is enhanced to 1.58 times and the SNR is increased 3dB approximately.

We-J-33

Virtual-image Generation and its Replication for Normal Viewing Image-plane Disk-type Multiplex Holograms

Yih-Shyang Cheng, Chih-Hung Chen
National Central University (R.O.C.)

The replication method for virtual-image generation in normal viewing disk-type multiplex holography is presented in this paper. The corresponding experimental result is also demonstrated.

We-J-34

Gray-Scale Modulation Code Design for Holographic Data Storage

Taehyung Park, Jaejin Lee, Sungbin Im
Soongsil University (Korea)

Multi-level holographic data storage (HDS) is considered as the next generation optical storage system owing to its high storage capacity and high data transfer rate. Two dimensional nature of pixelated page in HDS introduces new challenges in modulation codes. To combat two-dimensional inter-symbol interference (ISI) and inter-page interference (IPI), and improve error-correction, minimal inter-symbol intensity differences, minimum Hamming distance between codewords, balanced symbol distribution, and forbidding certain isolated pixel patterns are suggested as modulation constraints. In this paper we introduce integer programming models and a cutting plane algorithm that determine best set of codewords

satisfying modulation constraints. The proposed algorithm is applied to several 4-ary and binary codes.

We-J-35

Multilevel Modulation Codes for Holographic Data Storage Systems

Jaehun Lee, Jaejin Lee
Soongsil University (Korea)

Multilevel holographic data storage systems (HDSS) have a big advantage for capacity since it can store more than one bit per pixel. In this paper, we search the number of codewords for two-dimensional (2D) multilevel per pixel modulation codes in accordance with the code distance. Thus, it counts the codewords with various (1) number of levels per pixel, (2) number of pixels per codeword, and (3) the code distance values, respectively.

We-J-36

Development of Magnetic Nanobeads Measuring System for Bio Optical Disc

Masayuki Ono, Yuichi Hasegawa, Koji Tsujita, Shigehiko Iwama, Takahiro Aoki, Makoto Itonaga
JVC KENWOOD Corporation

We develop the magnetic nanobeads measuring system for bio optical disc by developing the detection algorithm and the FPGA circuitry. It enabled high sensitive and high throughput biomarker detection.

We-J-37

Localized Surface Plasma Resonance in Periodic Nano-pattern of Au Dot Array Biochip

Shuen-Chen Chen, Hsing-Cheng Yu
National Taiwan Ocean University (R.O.C.)

In recent years, in-vitro diagnostics (IVD) has come into wide use in qualitative or quantitative analysis of medical diagnosis and medicine development via fast development in biomedical technology. Immunoassay, molecular diagnostics, and point of care testing are about 50% of global IVD market, and biochip detection is one of the main products. Thus, development of biochip detection technology with cost-effective and high-sensitive characteristics plays an important role in researches. Localized surface plasma resonance (LSPR)[1] biochip detection technique that differs from surface plasma resonance (SPR) pumps excited source coupling to LSPR mode by nanostructure arrays coupling method [2]-[5]. It adopts a compact

optomechanical platform to achieve the high-sensitive characteristic system and is better than conventional SPR in biomedical detection. This study focuses on a development of gold (Au) dot array biochips fabricated by adopting LSPR to make the characteristic dimension of the nanostructure smaller than 200 nm. It not only can widely apply in SPR sensors, surface-enhanced Raman spectroscopy, and minute quantity molecule detection, but also can process SPR biochip detection technology with high sensitivity and precise. Additionally, it can be adopted in molecular and cellular biology while it combines with miniaturized spectrum measurement platform with high resolution.

We-J-38

3D Measurement Using Phase Shifting Digital Holography and Image Recognition

Sungbin Jeon, Do-Hyung Kim, No-Cheol Park, Young-Pil Park

Yonsei University (Korea)

In this study, we have proposed the 3D object inspection method of micro-optical components. Combine with both amplitude-side and phase-side information measurement, fast, accurate, and unified object inspection could be achieved.

We-J-39

Analysis of Extended Depth of Focus by Phase-Space Optics

Jie-En Li, Hao-Chien Chiu, Chung-Hao Tien

National Chiao Tung University (R.O.C.)

The position and propagating direction of optical waves can be formulated at the same time by phase-space optics. We examined the physical significance of WDF and provided the simulation of EDoF system as an example.

We-J-40

Optimization of Recording Conditions in Ultra-High-Speed Holographic Optical Correlation

Kanami Ikeda, Eriko Watanabe

University of Electro-Communications (Japan)

We have optimized the recording conditions to record a hologram with a single pulse by introducing a parameter called the similarity rate of images. These experiments enable ultra-high-speed correlation calculations for an image and video identification system.

We-J-41

Reconstructed Multiple Images on Coaxial Depth Direction from Computer Genarated Hologram

Sumio Nakahara[1], Kyoji Matsushima[1], Masaaki Takita[2], Yoshihiro Okino[3]

[1]Kansai University, [2]Takita R&D Co., LTD., [3]Fomer Kansai University (Japan)

We fabricated computer-generated holograms to make image data who is situated on the coaxial direction recognize persons using holograms with bright reconstruction ability and high SN ratio in various position. We used laser direct-write lithography.

18:10-18:30   Break

18:30-21:10   Banquet

Th-K: Hologram 2

Presiders: Osamu Matoba (Kobe Univ., Japan)
Tsutomu Shimura (Univ. of Tokyo, Japan)

Th-K-01 Invited

08:40 Research Activity on Spatial Light Modulators at Hamamatsu Photonics

Tsutomu Hara
Hamamatsu Photonics (Japan)

The spatial light modulator (SLM) is a key device for optical information processing. Therefore, various types of SLMs have been proposed and developed. An overview and history of our research activities on SLMs will be given.

Th-K-02

09:05 New Optical Modeling of the Effect of Mechanical Instabilities on Holographic Data Storage System using Time Average Holography

Ken-ichi Shimada[1], Toshiki Ishii[1], Taku Hoshizawa[1], Yuzuru Takashima[2]
[1]Hitachi, Ltd. (Japan), [2]The University of Arizona (USA)

A general and versatile formalization of signal degradation due to mechanical instabilities using the concept of time average holography is presented. A new optical compensation method to recover the degraded holographic image is also proposed.

Th-K-03

09:25 Angle and Peristrophic Multiplexing Holographic Memory with High Numerical Aperture Lens

Nobuhiro Kinoshita[1], Tetsuhiko Muroi[1], Koji Kamijo[1], Kazuyoshi Masaki[2], Toshio Ando[2], Takehiro Shimizu[2], Nobuo Saito[1]
[1]NHK, [2]Nippon Steel & Sumikin Chemical Co., Ltd. (Japan)

We discuss the required spacing for peristrophic multiplexing when using high numerical aperture lens. We then demonstrate low bit-error rate for 600 holograms recorded in a volume of medium using 150-angle- and 4- peristrophic- multiplexing.

Th-K-04

09:45 Support Vector Machine equalizer for Holographic Data Storage

Jae Jin Jeong, Keunhwi Koo, Seunghun Kim, Gyogwon Koo, Sang Woo Kim

POSTECH (Korea)

In this paper, we propose new equalizer which combines the equalizer and decoder by using support vector machine. The proposed method compared with the conventional method has low computation complexity and similar bit error rate performance.

Th-K-05

10:05 Compact Digital Holographic Microscope Utilizing Volume Holographic Optical Element

Yeh-Wei Yu, Ching-Cherng Sun

National Central University (R.O.C.)

We propose a volume holographic optical element to replace the BS and the high quality objective lens in digital holographic microscope. And thus shrink the size of digital holographic microscope.

10:25-10:45 Break

Th-L: Optical/Photonic Interconnect (Special)

Presiders: Osamu Matoba (Kobe Univ., Japan)
Akinori Furuya (NTT., Japan)

Th-L-01 Invited

10:45 High-Density and Wide-Bandwidth Silicon Optical Interposers

Yutaka Urino [1], Tatsuya Usuki [1], Junichi Fujikata [1], Masashige Ishizaka [1], Koji Yamada [1], Tsuyoshi Horikawa [2], Takahiro Nakamura [1], Yasuhiko Arakawa [3]
[1]Photonics Electronics Tech. Res. Association (PETRA), [2]AIST, [3]Univ. of Tokyo (Japan)

We have proposed a photonics-electronics convergence system to solve a bandwidth bottleneck in inter-chip interconnects. We demonstrated silicon optical interposers fully integrated with optical components achieving high bandwidth density of 30 Tbps/cm^2.

Th-L-02 Invited

11:10 Small and Smart Optical Components with Polymer Waveguide for High-Speed and Wide-Bandwidth Transmission

Makoto Fujiwara, Shinya Arai

Sumitomo Bakelite (Japan)

Optical I/O modules have been developed using fibers like an active optical cable, which size and transmission density are restricted by electric substrates, optical fibers, and lens components. We are going to propose a compact module using our polynorbornene based waveguide.

Th-L-03 Invited

11:35 Dependable Optically Reconfigurable Gate Array Architecture

Minoru Watanabe
Shizuoka Univ. (Japan)

In this presentation, I will introduce a dependable optically reconfigurable gate array architecture which can be reconfigured using an error-included configuration context that has been damaged by high-energy charged particles.

12:00-13:30 Lunch

Th-M: Memory Systems

Presiders: Masahisa Shinoda (Mitsubishi, Japan)
Kazuo Watabe (Toshiba, Japan)

Th-M-01 Invited

13:30 Artificial Cognitive Memory Based on Neuromorphic Engineering

Jing Pei, Lei Deng, Luping Shi
Tsinghua Univ. (China)

Artificial cognitive memory based on neuromorphic technology is the key component to support bio-inspired computing. This paper will address the key challenges and the possible solutions for developing the memory.

Th-M-02 Invited

13:55 Permanent Digital Data Storage: An Overview

Barry M. Lunt, Matthew R. Linford, Robert C. Davis
Brigham Young Univ. (U.S.A)

Permanent digital data storage has become increasingly important in the past few years. This paper reports on our research in this area, including the development of the M-Disc (in both DVD and BD formats), solid-state storage, and optical tape storage.

Th-M-03 Invited

14:20 "OPARG" to Realize the High Reliable Optical Archive Systems.

Sumitaka Matsumura
PIONEER (Japan)

Introduce OPARG activity that will enable to realize the high reliable optical archive systems and relationship with new JIS standard (JIS Z6017) in which long term preservation method for digital data is defined.

Th-M-04

14:45 100-layer Recording in Fused Silica for Semi-permanent Data Storage.

Ryo Imai[1], Manabu Shiozawa[1], Takao Watanabe[1], Shigeki Mori[1], Yasuhiko Shimotsuma[2], Masaaki Sakakura[2], Kiyotaka Miura[2], Koichi Watanabe[1]
[1]Hitachi, Ltd. , [2]Kyoto University (Japan)

A recording density of semi-permanent data storage using fused silica was improved by increasing the number of recording layers to 100. By the improvement, the recording density of 1.3 GB/inch^2 was achieved.

Th-M-05

15:05 Market Revolution of Optical Storage has Begun.

Ikuo Matsumoto, Emiko Sakata
Fujiwara-Rothchild, Ltd. (Japan)

The optical storage entered the new stage.Facebook optical storage system showed a new direction as a cold storage of an optical storage.The business of the cold storage in a huge data center is completely different from the approach of off-line archive.For that purpose,large capacity optical storage road map has been announced to decrease bit cost of a optical disc.

Th-PD: Post Deadline

Presiders: Yoshimasa Kawata (Shizuoka Univ., Japan)

Kimihiro Saito (Sony, Japan)
(15:25) Th-PD-01
(15:40) Th-PD-02
(15:55) Th-PD-03
(16:10) Th-PD-04

16:25-16:45 Award & Closing

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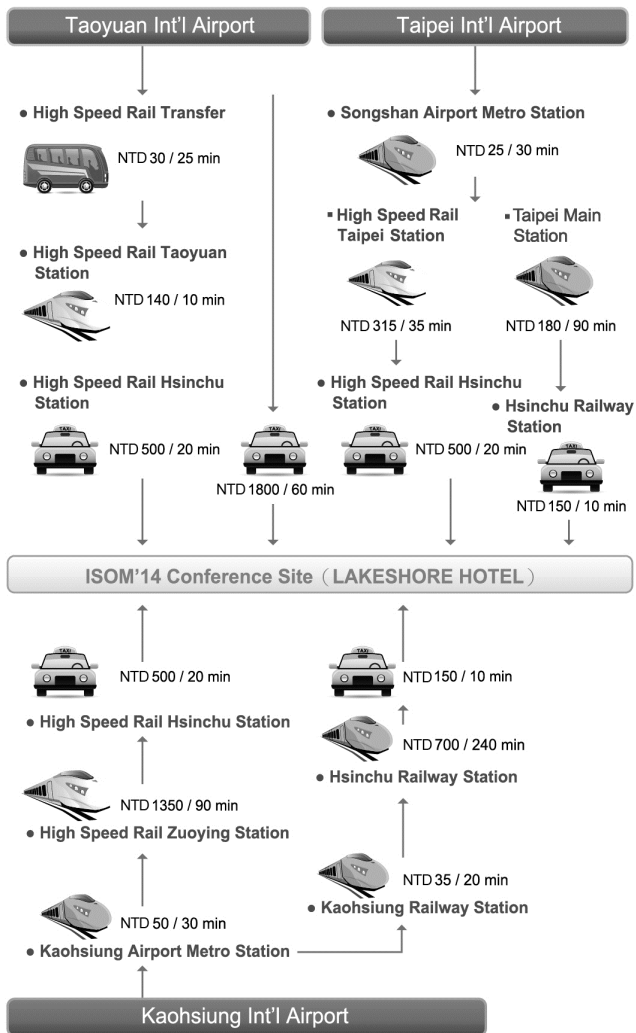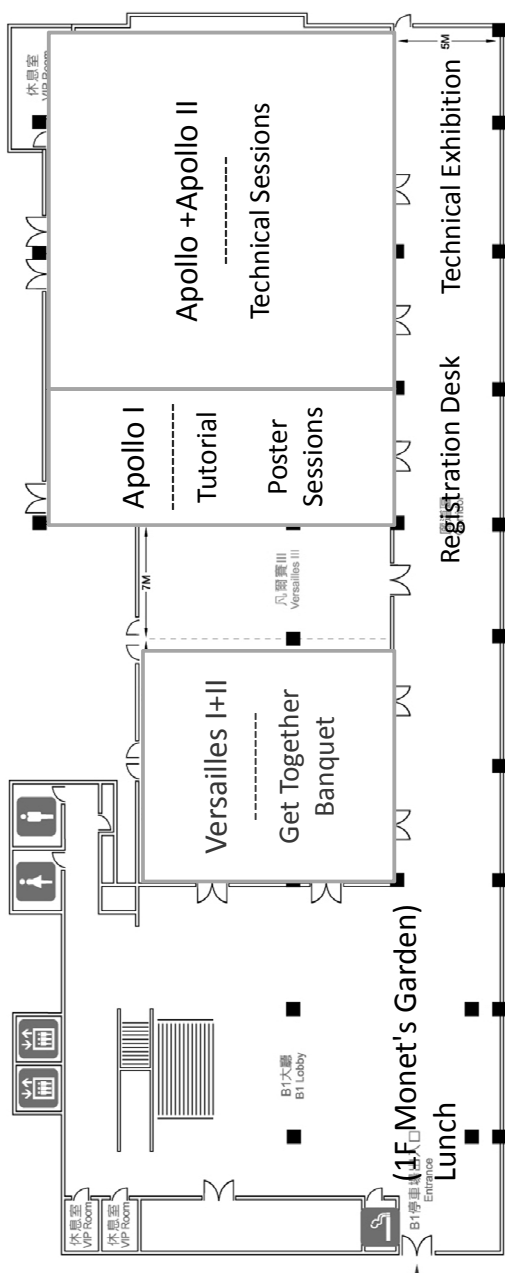Tsai, D. P. (Academia Sinica)

Getting to Hsinchu

ACCESS TO LAKESHORE HOTEL

Conference Site

CONFERENCE SITE FLOOR

館別Building：麗 池 館 Leith Castle
樓層Level：地下一樓Basement One
樓高Height：4.7M

VIP Room 休息室

Apollo +Apollo II
Technical Sessions

Apollo I
Tutorial
Poster Sessions

Technical Exhibition

Registration Desk

5M

7M

凡爾賽III
Versailles III

Versailles I+II
Get Together Banquet

B1大廳
B1 Lobby

(1F Monet's Garden)
Lunch

B1停車場入口
Entrance

VIP Room 休息室
VIP Room 休息室

GENERAL INFORMATION

I. Official Language

The official language of ISOM'14 is English.

II. Message Board

Official Information Board and Message Board will be set near the Registration Desk. Message will be taken during registration hours on Monday through Thursday and posted on the Message Board. Please check the bulletin board daily to receive your messages. Messages for participants at the meeting should be directed to ISOM'14 Symposium Registration Desk.

III. Visa Requirement

30-days visa-free privileges are afforded to citizens of the Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Liechtenstein, Lithuania, Luxembourg, Malaysia, Malta, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, U.K., U.S.A and Vatican City State.

For other countries, visas are required to enter Taiwan and can be obtained from R.O.C. embassies, consulates or designated representative offices in visitors' native countries. Tourist visas are recommended. Foreign nationals may obtain a tourist visa to visit the Republic of China for purposes of sightseeing, business, family visits, study or training, medical treatment, or other legitimate activities. Tourist visas may be single- or multiple-entry. Meanwhile, passports valid for at least 6 months are required for anyone who plans to visit Taiwan.

IV. Lunches

Lunches will be served by the ISOM'14 at Lakeshore Hotel 1F of Leith Castle, Monet's Garden.

V. Others

To receive further ISOM'14 announcement, please visit ISOM website (http://www.isom.jp/).

HOTEL ACCOMMODATIONS

A block of rooms has been reserved by Taiwan Information Storage Association for the convenience of the participants. The rooms are to be reserved on first-come first- served basis.

Those who wish to make hotel reservations should access the ISOM website (http://www.isom.jp/), where the hotel reservation forms can be downloaded. Please complete the reservation form and return it to the hotel before October 19, 2014. It is recommended for you to reserve the room as soon as possible.

Type	Room Rate
Executive Room (200cm×160cm)	NTD 2,800
Executive Deluxe (200cm×180cm)	NTD 3,300
Chalucet Twin (200cm×160cm×2)	NTD 4,000

* The hotel has agreed to offer the special rate to guests (ISOM'14).

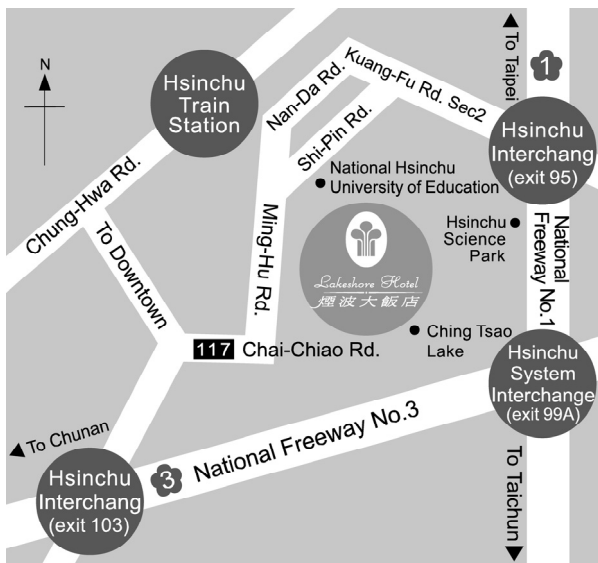* Including 10% of service charge and free breakfast

Official Hotels Information
Lakeshore Hotel (Conference hotel)
No. 773, Ming-Hu Rd., Hsinchu City, Taiwan
Tel：+886-3-5209242   Fax：+886-3-5209244
Website: http://www.lakeshore.com.tw/en/index.htm

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ISOM'14

International Symposium on Optical Memory

Lakeshore Hotel (煙波大飯店) , Hsinchu Taiwan
October 20-23, 2014

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