ISOM'12

INTERNATIONAL SYMPOSIUM ON OPTICAL MEMORY 2012

The National Museum of Emerging Science and Innovation (Miraikan), Tokyo, Japan

Sep. 30 - Oct. 4, 2012

SPONSORED BY

- The Japan Society of Applied Physics (JSAP)

- The Magnetics Society of Japan (MSJ)

- Optoelectronics Industry and Technology Development Association (OITDA)

Deadlines
Post Deadline Papers:
          August 1, 2012
Advance Registration:
          September 1, 2012

http://www.isom.jp/

Symposium Schedule

	Sunday Sep. 30	Monday Oct. 1	Tuesday Oct. 2	
9:00	Registration 15:00 -- 17:00	Registration 8:30 -- 13:00	Registration 8:30 -- 13:00	9:00
10:00		Opening Remarks & Keynote	Media and Mastering	10:00
		Hologram 1	Coffee break	
11:00			Special Session 2 "New Applications Related to Optical Storage Technologies 2"	11:00
		Coffee break		
12:00		Hologram 2		12:00
			ISOM'13/Photo	
13:00		Lunch	Lunch	13:00
14:00				14:00
15:00		New World	Basic Theory System and Components	15:00
16:00		Coffee break		16:00
		Special Session 1 "New Applications Related to Optical Storage Technologies 1"	Coffee break	
17:00	Get Together		Poster Session	17:00
18:00			Break	18:00
19:00			Banquet	19:00
20:00				20:00
21:00				21:00

	Wednesday Oct. 3	Thursday Oct. 4	
8:30	Registration 8:30 -- 12:00		8:30
9:00	Special Session 3 "Bio Technology"	High Density	9:00
10:00	Coffee break		10:00
11:00	Sepcial Session 4 ″Digital Archival Applications″	Coffee break	11:00
		Multilayer Recording	
12:00			12:00
13:00	Lunch	Lunch	13:00
14:00	Technical Tour	Drive Technology and Signal Processing	14:00
15:00		Post Deadline	15:00
16:00		Award & Closing	16:00
17:00			17:00
18:00			18:00
19:00			19:00
20:00			20:00
21:00			21:00

WELCOME TO ISOM'12

**WELCOME STATEMENT FROM
THE ORGANIZING COMMITTEE
CHAIRPERSON**

The 22nd International Symposium
on Optical Memory (ISOM'12)
will be held in Tokyo, Japan
Sept. 30-Oct. 4, 2012

On behalf of the International Symposium on Optical
Memory (ISOM) organizing committee, I am delighted to
welcome all of you to the ISOM'12 in Tokyo.

The last SOM meeting in Tokyo was held in 1994, and
remarkable progresses of technological and business
innovation have been created in global market during these
18 years.

CD family, DVD family and Blu-ray family, for example,
have greatly contributed to innovation of global PC industry,
game industry, audio/visual software distribution industry, as
well as to local economic growth in Taiwan/China, Korea,
Singapore, India and Japan.

We are very proud of the ISOM activities, because many of
the technologies which contributed to the innovation and to
the economic growth, have been first presented and discussed
in ISOM meetings.

But we understand today that the optical memory confronts
with critical phase: we need to find new killer applications to
create new innovations in addition to current industry, for
new economic growth.

I sincerely ask all of ISOM'12 participants not only to discuss
fourth and fifth generation optical memories or even other
technologies, but also to talk over new ISOM direction and
vision in coming ISOM'12 meeting.

Koichi Ogawa

Koichi Ogawa
Organizing Committee Chairperson ISOM'12

INTRODUCTION

The 22nd International Symposium on Optical Memory (ISOM) will be held from Sep. 30th to Oct. 4th 2012 at the National Museum of Emerging Science and Innovation (Miraikan) in Tokyo, Japan. 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.

The origin of ISOM was SOM (Symposium on Optical Memory) held in 1985 in Tokyo, and the 1st ISOM was held in 1987 in Tokyo. ISOM or SOM were held every year from 1985 and the total number of lectures reached around 2,860 so far. Therefore, ISOM and SOM contributed to having opportunities for a wide variety of discussions on optical memories.

In ISOM'10 and ISOM/ODS'11, new optical data storage systems and application systems were discussed as well as high density technologies or future technologies. In 2012, discussion on new technologies and ideas related to optical memory or storage systems and applications will be strongly expected according to the fields of ISOM from practical standpoints which were newly defined in ISOM'10.

The symposium site, Miraikan, is located at east part of Tokyo and very convenient place for reaching center and downtown of Tokyo. Miraikan was opened in July, 2001 and is a new type of science museum aiming to share the state-of-the-art knowledge and innovation with the whole society as part of enriched human culture.

A new sightseeing spot, the world's tallest tower of 634 meters named "Tokyo Sky Tree", emerged and is opened to the public in Tokyo. The Tokyo Sky Tree, which is also the world's tallest broadcasting tower, has two observation decks, one at 350 meters and the other at 450 meters above ground. There is a newly completed commercial complex, the "Tokyo Soramachi" meaning the sky town, near the tower, which has 312 shops and restaurants.

SCOPE OF THE SYMPOSIUM

ISOM'12 will discuss the current status of optical memory system design and applications, together with new developments in the areas of media, lasers, optical system, basic theory including computer simulation, 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.

In addition to ordinary contributed papers, a number of invited papers in cutting edge will be presented. In ISOM'12, four Special Sessions are also planned: They are focused on **"New Applications Related to Optical Storage Technologies**,**" "Bio Technology,"** and **"Digital Archival Applications**.**"** Distinguished researchers on the fields are invited for introducing their recent progress.

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

Scope from a Technical Standpoint

1. Basic Theory and Physical Optics
・ Structure Analysis
・ 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
・ 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. Systems and Applications
・ Optical Storage Systems
・ Archival Applications
・ Security Applications
・ Mobile Applications
・ Medical and Bio-Applications
・ New Applications

7. High-Density Recording
・ Holography
・ Volumetric Storage, Multi-Layer Recording
・ Scanning Probe and Near-Field Recording
・ Multiwavelength Recording and Bistable Devices
・ Multi-Level Recording
・ Hybrid Recording
・ Other Future Technologies

8. New World - Other Future Science and Technology Available to Information Storage

Fields from a Practical Standpoint

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

B. Optical Technology
・ Components
・ Material
・ Display
・ Apparatus

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

REGISTRATION

Advance Registration

The Symposium registration information and form can be obtained from the ISOM website (http://www.isom.jp/).

If you have any questions, please contact ISOM secretariat office.

Onsite Registration

The registration desk will be located at the seventh floor of the Miraikan from Sunday through Wednesday during the following hours.

Because the registration desk in the morning on October 1 is supposed to be so crowded, it is recommended to finish your registration within September 30.

Sep. 30:	15:00 - 17:00
Oct. 1:	8:30 - 13:00
Oct. 2:	8:30 - 13:00
Oct. 3:	8:30 - 12:00

Registration Fees

Type	On or before Sep. 1, 2012	After Sep. 1, 2012
Regular	50,000JPY	60,000JPY
Student & Retiree	10,000JPY	15,000JPY
Banquet	5,000JPY	7,000JPY
Additional Technical Digest	6,000JPY	6,000JPY

The currency is Japanese Yen (JPY).

The registration fee for the symposium includes admission to all the technical sessions, a copy of the technical digest. All the students are requested to show their Student ID cards on site.

Registration and Payment

Those who wish to attend ISOM'12 should access ISOM website (http://www.isom.jp/), where the procedure of the registration is described. Online registration is highly recommended. If online registration is not convenient for you, please contact secretariat office.

The advantage of early registration rate is available by **September 1** and the registration website will be opened until September 24. After September 25, registration has to be done on-site during the symposium.

Payment should be made in Japanese yen by bank transfer (inside Japan only) or credit card (Diners Club, AMEX, VISA, JCB and Master Card). No personal checks will be accepted.

Onsite payment should be made in Japanese yen only by cash.

Registration Cancellation Policy

As a rule, no refunds of the registration fee will be made for any reasons whatever. In the event of registrant unable to attend the symposium, a copy of the Technical Digest will be sent after the symposium.

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 min 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 strongly 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 210 cm high x 90 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 hr 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. 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 July 18 to August 1, 2012.

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 end of August, 2012 whether their papers are accepted.

▶ Time assigned for

Type	Total	Presentation	Discussion
Postdeadline	15 min	12 min	3 min

PUBLICATION OF SYMPOSIUM PAPERS

In addition to the Technical Digest available at the conference, the conference papers will be published as a special issue of the Japanese Journal of Applied Physics (JJAP) in September, 2013. The authors who will have, by themselves, presented papers at ISOM'12 will be allowed and strongly encouraged to submit their papers for publication in this special issue. The authors will be requested to download author's kits including an application form and a copyright form for the paper at the ISOM website (http://www.isom.jp/). The deadline for submission of manuscripts is January 28, 2013. 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'12.

No Photo   No Video   No Recorder

SPECIAL PROGRAMS

(1) Social Program

Get-Together Reception

Date & Time: Sunday, September 30, 17:00 - 19:00
Place: Miraikan 7F Sky view restaurant LA TERRE
Fee: No charge
 *All attendees including spouses are invited to the Get-Together Reception.

Banquet Reception

Date & Time: Tuesday, October 2, 18:15 - 20:15
Place: Miraikan 7F Sky view restaurant LA TERRE
Fee: Advance registration 5,000JPY
      Onsite registration 7,000JPY
 *Ticket for the Banquet Reception is not included in the registration fee. Application can be made online. (The form is available on the ISOM website.)

(2) Technical Tour (Tentative)

Date & Time: Wednesday, October 3, 13:10 -- 17:00
Places: AIST Tokyo Waterfront and NHK Archives
Fee: No charge

Schedule:

 The National Institute of Advanced Industrial Science and Technology (AIST) Tokyo Waterfront (13:10-14:10) --> bus --> NHK(Japan Broadcasting Corporation) Archives Facility (15:00-16:00) --> bus --> JR Shimbashi Station (17:00)

Note: Advance online registration is required. The registration will be closed as soon as applicants reach 90 people.

<AIST Tokyo Waterfront>
Bio-IT integrated technology research center under the National Institute of Advanced Industrial Science and Technology (AIST).

http://unit.aist.go.jp/waterfront/en/index.html

<NHK Archives Facility>
One of the world's leading storage facilities of this kind, with capacity for up to 1.8 million videotapes.

http://www.nhk.or.jp/archives/kawaguchi/about/Archives_6p_E.pdf

(3) Excursion

If you want to get the information on Tokyo City Tour, please ask at the registration desk.

Please see ISOM website (http://www.isom.jp) for more information.

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TECHNICAL PROGRAM

Monday, Octber 1, 2012

A: Opening & Keynote

Presiders: Yoshimasa Kawata (Shizuoka Univ., Japan)
No-Cheol Park (Yonsei Univ., Korea)

Mo-A-01

9:00   Opening Remarks
Koichi Ogawa (Univ. of Tokyo, Japan)
Organizing Committee Chairperson
Masahisa Shinoda (Mitsubishi, Japan)
Steering Committee Chairperson

Mo-A-02 *Keynote*

9:15   Photocatalytic Reactor Using ZnO Nanorods on Optical Disc

Li-Chung Kuo[1], Yu Lim Chen[1], Ming Lun Tseng[1], Hung Ji Huang[2], Din Ping Tsai[1, 3]
[1]National Taiwan Univ. (R.O.C), [2]National Applied Research Laboratories (R.O.C), [3]Academia Sinica (R.O.C)

We demonstrated a novel application of DVDs by chemical synthesized ZnO nanorods on polycarbonate DVD substrates. These photocatalytic optical discs has shown great photocatalytic activities and can provide an option in recycled CDs and water treatment.

B: Hologram 1

Presiders: Hideharu Mikami (Hitachi, Japan)
Nobuhiro Kinoshita (NHK, Japan)

Mo-B-01 *Invited*

9:45   Improvement of SNR and BER in Holographic Data Storage using Adjusted CLSF Filter

No-Cheol Park, Do-Hyung Kim, Kyoung-Su Park, Hyunseok Yang, Young-Pil Park
Yonsei Univ. (Korea)

Optimized image restoration method is suggested in angular multiplexing page based holographic data storage. To improve the SNR and BER, adjusted CLSF filter is calculated from the PSF as the image restoration filter. Simulation is performed to verify the proposed method. As a result, proposed method shows the dramatic improvement of SNR and BER compare with previous method.

Mo-B-02

10:10   1 Tbits/inch^2 Recording in Angular-Multiplexing Holographic Memory

Makoto Hosaka[1], Toshiki Ishii[1], Mika Yamaguchi[2], Shogo Koga[2], Asato Tanaka[2], Taku Hoshizawa[1]
[1]Hitachi, Ltd. (Japan), [2]Mitsubishi Chemical Group Science and Technology Research Center, Inc. (Japan)

We developed the iterative scheduling optimization technique depending on SSR for page oriented holographic recording. The pages recorded with this technique showed SNR of over 2.9 dB. As the results, 1 Tbits/inch^2 was achieved experimentally.

Mo-B-03

10:30   Super Resolution Readout Method for Holographic Reproduced Data

Norihiko Ishii, Tetsuhiko Muroi, Nobuhiro Kinoshita, Koji Kamijo, Hiroshi Kikuchi
NHK (Japan)

The super resolution readout method is discussed to settle the unsatisfied sampling theory and pixel mismatch all at one time between Spatial Light Modulator and Complementary Metal Oxide Semiconductor camera.

Mo-B-04

10:50   Multi-Level Self-Referential Holographic Data Storage

Masanori Takabayashi[1], Atsushi Okamoto[2], Masatoshi Bunsen[3], Takashi Okamoto[1]
[1]Kyushu Institute of Technology (Japan), [2]Hokkaido Univ. (Japan), [3]Fukuoka Univ. (Japan)

A way to record multi-level signals in self-referential holographic data storage, which can realize purely one-beam holographic recording and direct detection of the recorded phase-modulated signals, are described and numerically demonstrated.

11:10-11:30 Coffee break

C: Hologram 2

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

Tsutomu Shimura (Univ. of Tokyo, Japan)

Mo-C-01

11:30 **Defocus Aberration Compensation of Hologram Distortion in Holographic Data Storage**

Tetsuhiko Muroi[1], Nobuhiro Kinoshita[1], Norihiko Ishii[1], Koji Kamijo[1], Yoshimasa Kawata[2], Hiroshi Kikuchi[1]

[1]Japan Broadcasting Corp. (Japan), [2]Shizuoka Univ. (Japan)

We compensated for hologram distortion and decreased the bER of the reproduced data by controlling the defocus aberration of the reference beam wavefront. This technology will be effective in a high-data-transfer rate recoding system.

Mo-C-02

11:50 **Direct Observation of Peristrophic Multiplexing Holograms with a Phase Contrast Microscope**

Masaki Kanatori[1], Wataru Inami[1], Yoshimasa Kawata[1], Norihiko Ishii[2], Nobuhiro Kinoshita[2], Tetsuhiko Muroi[2], Hiroshi Kikuchi[2]

[1]Shizuoka Univ. (Japan), [2]NHK Science and Technology Research Laboratories (Japan)

We directly observed holograms in photopolymer materials with a phase contrast microscope. We successfully observed a single and peristrophic multiplexed holograms. The diffraction efficiency of multiplexed holograms was evaluated with FFT of the observation.

Mo-C-03

12:10 **High Resolution Image Restoration for Holographic Memory Using Super-resolution Technique**

Satoshi Honma[1], Takehiro Watanabe[1], Toru Sekiguchi[1], Hisatoshi Funakoshi[2]

[1]Univ. of Yamanashi (Japan), [2]Gifu Univ. (Japan)

We propose signal quality improvement with a super resolution method. A page data is captured several times shifting on the low-resolution camera slightly. The original high-resolution image is reconstructed from multiple low-resolution images.

Mo-C-04

12:30 **Line Tracking applied Synchronous Mark for Holographic Data Storage System**

Jae-seong Lee[1], Nakyeong Kim[2], Sung-yong Lim[1], Kyoung-su Park[1], No-cheol Park[1], Hyunseok Yang[1], Young-pil Park[1]
[1]Yonsei Univ. (Korea), [2]LG Electronics (Korea)

The virtual detector follows certain rows and columns of data page. Intersection of the tracking line plays the role of the synchronous mark. The suggested method can compensate the distortion without any data density loss.

12:50-14:20 Lunch

D: New World

Presiders: Minoru Takeda (Kyoto Institute of Tech., Japan)
Junji Tominaga (AIST, Japan)

Mo-D-01

14:20 **Simultaneous Multi-Bit Recording in Fused Silica for Permanent Storage**

Manabu Shiozawa[1], Takao Watanabe[1], Eriko Tatsu[1], Mariko Umeda[1], Toshiyuki Mine[1], Yasuhiko Shimotsuma[2], Masaaki Sakakura[3], Miki Nakabayashi[2], Kiyotaka Miura[2], Koichi Watanabe[1]
[1]Hitachi, Ltd. (Japan), [2]Kyoto Univ. (Japan), [3]Kyoto Univ. Office of Society-Academia Collaboration for Innovation (Japan)

A simultaneous multi-bit recording in fused silica with a femtosecond laser and a spatial light modulator for permanent storage was demonstrated. We fabricated a 4-layer sample and obtained an S/N greater than 15 dB.

Mo-D-02

14:40 **Driveless Read System for Permanent Storage in Synthetic Fused Silica**

Takao Watanabe[1], Manabu Shiozawa[1], Eriko Tatsu[1], Shigeharu Kimura[1], Mariko Umeda[1], Toshiyuki Mine[1], Yasuhiko Shimotsuma[2], Masaaki Sakakura[3], Miki Nakabayashi[2], Kiyotaka Miura[2], Koichi Watanabe[1]

[1]Hitachi, Ltd. (Japan), [2]Kyoto Univ. (Japan), [3]Kyoto Univ. Office of Society-Academia Collaboration for Innovation (Japan)

A driveless read system for permanent storage inside synthetic fused silica was demonstrated. Four-layer, 40-Mbyte-per-square-inch data without error-correction code (ECC) can be read from low-powered, 19.5-times-magnification images with bit-error rate of less than 4.63E-3.

Mo-D-03

15:00 **A Study on Flying Stability of TAMR System with LD Mount Light Delivery**

Jonghak Choi, No-Cheol Park, Kyoung-Su Park, Young-Pil Park

Yonsei Univ. (Korea)

We propose the available design of epoxy location and shape through slider behavior simulation.

Mo-D-04

15:20 **Evaluation of Crosstalk and Optimization of Input Power for Various HAMR Media Structures based on Direct Optical-to-Thermal Energy Conversion**

Young-Joo Kim, Ki-Hyun Kim, Dong-Su Lim

Yonsei Univ. (Korea)

Three media structures were evaluated for HAMR application using direct near-field optical-to-thermal energy conversion method. DTM and SPAH media shows no crosstalk while SPAH media has an advantage with much lower required input power.

15:40-16:00 Coffee break

E: Special Session 1 "New Applications Related to Optical Storage Technologies 1"

Mo-E-01 *Invited*

16:00 **Optical Switches for Future Photonic Network System Using Phase-Change Material and Si Waveguides**

Hiroyuki Tsuda

Keio Univ. (Japan)

Optical switches using phase-change material and Si waveguides are proposed. Thanks to the large refractive index change of phase-change material, they can be very small with broadband, high-speed and self-holding characteristics.

Mo-E-02 *Invited*

16:25 **Electrical Phase-Change Memory Fabricated on Optical Memory Disc**

Junji Tominaga, Paul Fons, Alexander V. Kolobov, Takashi Nakano

National Institute of Advanced Industrial Science and Technology (Japan)

We demonstrate a possibility to fabricate millions of electrical phase-change memory devices using digital versatile disc (DVD) technology on a plastic disc. The optical and electrical properties of the devices can be evaluated on the same disc platform.

Mo-E-03 *Invited*

16:50 **Information-Processing Photonics for Yottabyte-Scale Information Era ~Necessity for Developments and its Technology Roadmap~**

Satoshi Iwamoto

The Univ. of Tokyo (Japan)

Photonics technology will play essential roles for realizing energy-efficient high-performance information processing systems. We discuss the requirements on photonics technology and its future direction towards the up-coming YB-scale information era.

Mo-E-04 *Invited*

17:15 **The K Computer and Future Expectations for Optical Devices**

Motoyoshi Kurokawa

RIKEN (Japan)

The K computer known as the world's first supercomputer achieved LINPACK benchmark of 10.51 Peta-FLOPS. In this talk presents optical technologies, such as data transfer path, unquestionably required for the world's top-class supercomputer development filed.

F: Media and Mastering

Presiders: Keiichiro Yusu (Toshiba, Japan)
Makoto Itonaga (JVC-Kenwood, Japan)

Tu-F-01 *Invited*

9:00 **Three-dimensional Nano-fabrication of Polymer and Metal Material using Nanoimprint Lithography**
Jun Taniguchi
Tokyo Univ. of Science (Japan)

Three-dimensional nano-fabrication is promising technology for optical memories, optical devices, and so on. Nanoimprint lithography has applied to three-dimensional nano-transfer of both polymer and metal material. The resolutions of both are less than 100 nm.

Tu-F-02 *Invited*

9:25 **Phase Change Lithography and Wet-etching Based on Metallic Glass Materials**
B. J. Zeng, X. S. Miao, Z. Li, W. L. Zhou
Huazhong Univ. of Science and Technology (China)

In this presentation, we introduce our work on the Phase Change Lithography technology. Metallic glass films are fabricated, lithographed and etched with the optimized parameters. Our optical system and the lithography results are presented.

Tu-F-03 *Invited*

9:50 **Electron-Beam Mastering and Nanoimprint Molds Fabrication for High-Density Circumferentially Aligned Patterns**
Takeru Okada, Jiro Fujimori, Hiroshi Tanaka, Hiroaki Kitahara, Tetsuya Iida
Pioneer Corp. (Japan)

Next-generation optical disks and patterned magnetic media require circumferentially-aligned dense patterns. High-density electron-beam lithography processes and fabrication of nanoimprint molds were demonstrated using an electron-beam recorder with a rotary stage.

Tu-F-04

10:15 **Deriving Impulse Response and Resolution Limits of an InSb-Based Super-Resolution System from Static Experiments via a Channel Model**

Dietmar Hepper
Deutsche Thomson OHG (Germany)

Development of a super-resolution optical disc system is facilitated by developing an optical channel model from experiments using a static tester, deriving the optical channel impulse response from the model and estimating the resolution limit.

10:35-10:55 Coffee break

G: Special Session 2 "New Applications Related to Optical Storage Technologies 2"

Presiders: Yoshiteru Murakami (Sharp, Japan)
Osamu Matoba (Kobe Univ., Japan)

Tu-G-01 *Invited*

10:55 **Laser Display - Technology and Application -**
Sunao Kurimura
National Institute for Materials Science (NIMS) (Japan)

Newly emerging technology, Laser Display, will be reviewed and introduced, having wide color gamut and focus-free nature. Cutting-edge laser sources together with sophisticated optics extend projection technology and open new application such as traffic sign.

Tu-G-02 *Invited*

11:20 **High Power Blue Laser Diodes for Laser Display**
Shin-ichi Nagahama, Shingo Masui, Tomoya Yanamoto
Nichia Corp. (Japan)

For laser display, we fabricated high power blue LDs by using GaN-based material. The optical output power, voltage and wall-plug efficiency of the LDs at forward current of 1.2 A were 1.63 W, 4.38 V and 31%, respectively. The estimated lifetime was over 30,000 hours.

Tu-G-03 *Invited*

11:45 **Light-addressed Magneto-optic Spatial Light Modulator for Three-dimensional Electronic Holographic Displays**

Hiroyuki Takagi, Yu Eto, Kazuki Nakamura, Pang Boey Lim, Mitsuteru Inoue

Toyohashi Univ. of Technology (Japan)

We have demonstrated light-addressed magneto-optic spatial light modulators (MOSLMs) with submicron pixels for the holographic wide-viewing-angle displays. These experiment results demonstrated that MOSLMs are promising for glass-free holographic three-dimensional displays.

Tu-G-04 *Invited*

12:10 **Holographic Optical Correlation System for Practical Application**

Eriko Watanabe

The Univ. of Electro-Communications (Japan)

With the collaboration of optical correlation and co-axial holography, we have developing high-speed video identification system on the Internet. We present the technology and functionalities of this system and the effectiveness of the high-speed performance from the experimental results.

12:35-12:50 ISOM'13 Announcement & Photo

12:50-14:15 Lunch

H: Basic Theory/System and Components

Presiders: Din Ping Tsai (National Taiwan Univ., R.O.C)

Tu-H-01

14:15 **Focusing Characteristics of a Spiral Shape Plasmonic Lens**

Minoru Takeda[1], Shinpei Okuda[1], Tsutomu Inoue[2], Kento Aizawa[2]

[1]Kyoto Institute of Technology (Japan)
[2]JASCO Corp. (Japan)

We designed and fabricated a spiral shape plasmonic lens with 4μm nominal diameter operating at 405 nm wavelength, and confirmed it can generate a subwavelength focusing spot at several micrometers apart from the lens surface.

Tu-H-02

14:35 Scatterometry of Slant Incidence to Isolated Scatters for High-density Memory

Tetsuya Hoshino[1], Toyohiko Yatagai[2], Masahide Itoh[1]

[1]Univ. of Tsukuba (Japan), [2]Utsunomiya Univ. (Japan)

Only one time FT enables us to measure distance between scatters with high precision. We show slant incident light is useful to improve resolution of this analysis in measuring isolated convexes for high-density memory.

Tu-H-03

14:55 Complex Amplitude Reconstruction of Nanopits

Shinji Ishikawa, Yui Ohmura, Mitsunari Kamiharako, Jun-ichiro Sugisaka, Yoshio Hayasaki
Utsunomiya Univ. (Japan)

We demonstrate an optical reading of pits with a ten-nanometer scale using FDTD method that virtually realized the interference microscope, and estimate the ability of the reconstruction of the nanostructure using the complex amplitude.

Tu-H-04

15:15 Dynamic Recording in Gold-nanorod Dispersed Optical Discs

Md Azim Ullah[1], Masatoshi Tsuji[2], Xiangping Li[1], Yoshimasa Kawata[2], Min Gu[1]

[1]Swinburne Univ. of Technology (Australia), [2]Shizuoka Univ. (Japan)

We report on femtosecond laser induced dynamic recording in gold-nanorod dispersed optical discs. Gold-nanorod dispersed optical discs were fabricated. Their dynamic recording performance was investigated in a homebuilt dynamic recording system.

Tu-H-05

15:35 **Nano-Gap Servo Algorithm for a High-Speed Plasmonic Nanolithography**

Geon Lim, Guk-Jong Choi, Taeseob Kim, Won-Sup Lee, No-Cheol Park, Kyung-Su Park, Young-Pil Park
Yonsei Univ. (Korea)

The paper proposes nano-gap servo algorithm for high-speed nanolithography using the gap-curve, the mode-switching method, and the robust controller against patterning system on PR-coated wafer in near-field.

15:55-16:15 Coffee break

I: Poster Session

Presiders: Yoshimasa Kawata (Shizuoka Univ., Japan)
Mitsuru Irie (Osaka Sangyo Univ., Japan)
Takashi Kikukawa (TDK, Japan)
Toshimichi Shintani (AIST, Japan)

Tu-I-01

16:15 **Improvement of Reconstructed Image of Magnetic Hologram with Magnetic Garnet films**

Naoto Sagara, Pang Boey Lim, Hiroyuki Takagi, Yuichi Nakamura, Mitsuteru Inoue
Toyohashi Univ. of Technology (Japan)

Magnetic garnet films can be used as rewritable media for the holographic memory. we discuss grain size of garnet on the light scattering and the effect of thermal diffusion on formation of interference pattern.

Tu-I-02

Materials Study of Nanoscale Fuses for Solid State Data Storage

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

The data in present solid-state storage solutions is ephemeral. This paper outlines research to study materials for a permanent solid-state storage solution.

Tu-I-03

The Effect of Geometry on Nanoscale Tellurium Fuses for Solid- State Data Storage

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

The data in present solid-state storage solutions is ephemeral. This paper outlines research to study materials for a permanent solid-state storage solution.

Tu-I-04

Towards a New Material for SS WORM Storage

Barry M. Lunt, Anthony Pearson, Robert Davis, Hao Wang, Sarah Jamieson, Matthew R. Linford
Brigham Young Univ. (U.S.A.)

The data in present solid-state storage solutions is ephemeral. This paper outlines research to develop a permanent solid-state storage solution based on new materials that are compatible with current IC manufacturing processes.

Tu-I-05

Recording Marks and Recording Mechanism Observation of Transparent Write-Once Blu-ray Disc

Hung-Chuan Mai[1], Shang-Hsien Rou[1], Hao-Chia Liao[1], Lance Lee[2], Ray Huang[2], Odysseus Lee[2]
[1]Solar Applied Materials Technology Corp. (R.O.C.), [2]CMC Magnetic Corp. (R.O.C.)

Recording marks and recording mechanism of Si/Cu alloy bi-layer in a transparent disc were investigated. Satisfactory signal quality and optical contrast were found due to distinct grain coarsening.

Tu-I-06

Recording Characterization of CuSiCr/Si Bi-layer for High-Speed Write-Once Blu-ray Disc

Hung-Chuan Mai, Shang-Hsien Rou, Hao-Chia Liao, Yung-Chun Hsueh, Hsien-Chun Wu
Solar Applied Materials Technology Corp. (R.O.C.)

The characterizations of CuSi alloy/Si bi-layer were investigated. In-situ Reflectivity/XRD characterization revealed that CuSi recrystallization and Si crystallization are mainly recording mechanism. CuSiCr/Si bi-layer has low activation energy and large modulation.

Tu-I-07

Fine Error Prediction Tracking Control Based on Precise Disturbance Modeling for Optical Disk

Naohide Sakimura[1], Tatsuya Nakazaki[1], Kiyoshi Ohishi[1], Toshimasa Miyazaki[1], Daiichi Koide[2], Haruki Tokumaru[2], Yoshimichi Takano[3]

[1]Nagaoka Univ. of Technology (Japan), [2]Japan Broadcasting Corp. (Japan), [3]NHK Engineering Service Inc. (Japan)

In order to realize the accurate simulation, this paper proposes a new periodic disturbance model using the experimental spectrum. The proposed model realizes the accurate simulation fine error prediction control system for an optical disk.

Tu-I-08

Simplified Transfer Function of Write Compensation for Phase Change Optical Disks

Takaya Tanabe, Kotaro Sakamoto, Kohei Okubo
Ibaraki National College of Technology (Japan)

A simplified transfer function of write compensation for phase change optical disks was derived from a cooling process of recording layer and verified experimentally.

Tu-I-09

An Evolutionary Algorithm to the Threshold Detection Method for the M-ary Holographic Data Storage

Sunho Kim, Sungbin Im
Soongsil Univ. (Korea)

In this paper, we propose an adaptive threshold detection method with a simple genetic algorithm for the M-ary holographic data storage system.

Tu-I-10

Domain Bloom in Super-RENS Read-out Signals

Sungbin Im, Sehwang Park, Woosik Moon
Soongsil Univ. (Korea)

We investigate the effect of the domain bloom on the super-RENS read-out signal with the asymmetric waveform conversion scheme.

Tu-I-11

Read Performance with Low NA Blu-ray OPU

Mats Öberg[1], Antoon Dekker[2], Jeroen Dorgelo[2], Brian Macocq[2], Tetsuo Nishihara[3], Christopher Painter[1], Sumio Sekigawa[3]

[1]Marvell Semiconductor, Inc (U.S.A.), [2]Marvell Netherlands B.V (The Netherlands), [3]Marvell Accel K.K.L. (Japan)

We are showing comparable read back performance using low Numerical Aperture (NA=0.75) Blu-ray OPUs with regular (NA=0.85) OPUs. Lower NA increases system margins for defocusing and primary aberrations, and may allow design of cheaper OPUs.

Tu-I-12

6/9 4-ary Modulation Code for 4-level Holographic Data Storage

Keunhwan Park, Soonsuk Kim, Jinyoung Kim, Jaejin Lee
Soongsil Univ. (Korea)

In order to reduce ISI effects, we propose 6/9 4-ary two-dimensional modulation code for multi-level holographic data storage.

Tu-I-13

A 2/3 Modulation Codes for Multi-Level Holographic Data Storage based on an Integer Programming Model

Gukhui Kim, Jinyoung Kim, Jaejin Lee, Taehyung Park
Soongsil Univ. (Korea)

We propose a 2/3 modulation codes selection problem for the multi-level holographic data storage and formulate the problem as a mixed integer programming problem.

Tu-I-14

A Simple 2/3 Modulation Code for Multi-level Holographic Data Storage

Soo Youn Kim, Jinyoung Kim, Jaejin Lee
Soongsil Univ. (Korea)

To overcome interference, we propose a 2/3 multi-level modulation code for multi-level holographic data storage.

Tu-I-15

Reliability Evaluation of Long-term Storage and Lifetime Estimation in Compact Disc

Mitsuru Irie[1], Yumiko Tani[1], Yoshihiro Okino[2], Takahiro Kubo[3]

[1]Osaka Sangyo Univ. (Japan), [2]Kansai Univ. (Japan), [3]T. KUBO Eng. Sci. Office (Japan)

This paper presents discussion of long-term storage reliability for CD media hat manufactured in 1982 and recent study of estimating method for the archival life expectancy based on the ISO/IEC standard.

Tu-I-16

Cost-Effective Electro-Optic Sensor Module for Intra-body Communication Using Optical Pickup Technology

Mitsuru Shinagawa[1], Ai-ichiro Sasaki[2], Akinori Furuya[2], Hiroki Morimura[2], Kimihisa Aihara[2]

[1]Hosei Univ. (Japan), [2]NTT Corp. (Japan)

We developed a cost-effective EO sensor using optical pickup technology for intra-body communication. It uses the small and low-cost optical components used in compact disc players. The sensor was successfully applied to 10-Mbps intra-body communication.

Tu-I-17

EO Sensor Fabricated using a Bulk Cleavage Technique and its Characteristics for Near-field Intra-body Communication

Akinori Furuya[1], Aiichiro Sasaki[1], Hiroki Morimura[1], Kimihisa Aihara[1], Mitsuru Shinagawa[2]

[1]NTT Microsystem Integration Laboratories (Japan), [2]Hosei Univ. (Japan)

In this study, we examined the application of an EO sensor to a near-field intra-body communication module. We describe how to fabricate the EO sensor and its characteristics.

Tu-I-18

High Speed Plasmonic Nanolithography with Plasmonic Solid Immersion Lens Optical Head

Won-Sup Lee, Taeseob Kim, Geon Lim, Guk-Jong Choi, Hang-Eun Joe, No-Cheol Park, Byung-Kwon Min, Young-Pil Park, Kyoung-Su Park
Yonsei Univ. (Korea)

We demonstrated high-speed plasmonic nanolithography system with SIL-based near-field optics. We achieved a resolution of ~70 nm with patterning speed of 100 mm/s maintaing 20 nm gap.

Tu-I-19

Three-dimensional Holographic Display using Amorphous TbFe Film

Yu Eto, Kazuki Nakamura, Kazuki Matsugami, Hiroyuki Takagi, Mitsuteru Inoue
Toyohashi Univ. of Technology (Japan)

We fabricated two-dimensional array which is made of submicron magnetic domain with a-TbFe films. We obtained three-dimensional holographic images that has a wide viewing angle of 30 degrees with a-TbFe films.

Tu-I-20

Design a New Type Guide Feeding System in an Optical Disk Drive

Wonseok Oh[1], Doohyun Baek[1], Jong-Beom Park[1], Youngin Choi[1], Kyoung-Su Park[1], No-Cheol Park[1], Young-Pil Park[1], Jae-Sung Lee[2], Han-Baek Lee[2]
[1]Yonsei Univ. (Korea), [2]Hitachi-LG Data Storage (Korea)

Nut-type guide feeding system is developed for the precise and high-speed control of optical pickup. Dynamic model is constructed and operational behavior of guide feeding system are predicted.

Tu-I-21

Suppression of Axial Vibration of a Flexible Disk under High Speed Rotation

Yong Hyuk Jeon, Yoon Chul Rhim
Yonsei Univ. (Korea)

Theoretical and numerical analysis of damping effects of holes and air flow rates on axial vibration of rotating flexible disk.

Tu-I-22

Data Stability Evaluation of DVD-R Media according to the Recording Speed for Archival Application

Jae-Yong Lee, Kwan-Yong Lee, Sun-Joo Park, Young-Joo Kim
Yonsei Univ. (Korea)

We implemented the acceleration aging test for optical disks recorded by different recording conditions and analyzed the effect of recording speed to the archival application by measuring PI sum 8, RF signal and DC jitter.

Tu-I-23

Super-resolution Readout of Data Pit Trains with Narrowed Track-pitch to Diffraction Limit

Kenya Nakai[1], Masayuki Ohmaki[1], Nobuo Takeshita[1], Bérangère Hyot[2], Bernard Andre[2], Ludovic Poupinet[2], Takayuki Shima[3]
[1]Mitsubishi Electric Corp. (Japan), [2]CEA-LETI, MINATEC (France), [3]National Institute of Advanced Industrial Science and Technology (Japan)

Enhancement of radial density with super-resolution effect in 240 nm- narrowed track pitch corresponding to diffraction limit is investigated. bER value below criterion of 3.0E-4 is experimentally confirmed on 66.7 GB capacity super-RENS ROM disc.

Tu-I-24

Investigation of Angular Momentum Multiplexing in Microholographic Recording

Ryuichi Katayama
Fukuoka Institute of Technology (Japan)

A novel multiplexing method in microholographic recording, in which multiplexing is carried out by changing orbital angular momentum of beams for recording and readout, was proposed and its possibility was investigated through readout signal simulation.

Tu-I-25

Experiment on Holographic Recording/Retrieving of Spatially Phase-modulated Datapages with Embedded Phase-shift

Masatoshi Bunsen[1], Shuhei Umetsu[1], Masanori Takabayashi[2], Atsushi Okamoto[3]
[1]Fukuoka Univ. (Japan), [2]Kyushu Institute of Technology (Japan), [3]Hokkaido Univ. (Japan)

A novel technique for the complex amplitude detection of the retrieved datapages by preliminary embedding the phase-shift in the datapage is proposed for holographic storage. The single-shot detection of the phase-modulated datapage is demonstrated.

Tu-I-26

Spatial Spectrum Diffusion and Digital Phase Conjugate Reconstruction for Suppressing Inter-Page Crosstalk in Holographic Data Storage

Atsushi Shibukawa, Atsushi Okamoto, Yuta Wakayama
Hokkaido Univ. (Japan)

We proposed a new technique using spatial spectrum diffusion and digital phase conjugate reconstruction, in which inter-page crosstalks are spread out by a random diffuser through electronic processing based on a phase detection method.

Tu-I-27

Numerical Evaluation of Shift Multiplexing in Coaxial Holographic Memory Using Spatial Phase-Modulated Lightwaves

Teruyoshi Nobukawa, Takanori Nomura
Wakayama Univ. (Japan)

The shift selectivity and multiplexing in a coaxial holographic memory using spatial phase-modulated lightwaves are investigated. It was shown that the shift multiplexing using spatial phase-modulated lightwaves was available.

Tu-I-28

Shift Selectivity Evaluation in Collinear Holographic Memory Using High-Speed Full Motion Simulator with GPU Acceleration

Hisatoshi Funakoshi[1], Atsushi Okamoto[2]
[1]Gifu Univ. (Japan), [2]Hokkaido Univ. (Japan)

We developed a high-performance simulator with GPU acceleration, whose calculation speed is over 50 times faster than CPU-based computing. Shift selectivity in collinear holographic memory was evaluated under the condition of realistic beam exposures.

Tu-I-29

Random Phase Multiplexing using Micro-lens Diffuser

Xuan-Hao Lee, Yeh-Wei Yu, Che-Chu Lin, Ching-Cherng Sun
National Central Univ. (R.O.C.)

A study of phase multiplexing for volume holographic storage with use of a phase plate of micro lens array is proposed and demonstrated. The experiment are demonstrated.

Tu-I-30

Hologram Multiplexed Recording Method to Aim at Several Terabit Data Density

Kaito Okubo, Shohei Ozawa, Hiroyuki Kurata, Yuta Nagao, Takaaki Matubara, Keiko Yamamoto, Atushi Arai, Manabu Yamamoto
Tokyo Univ. of Science (Japan)

Several terabit per square inch is demanded for the archive memory system. In this text, we studied about a record reproduction method of hologram memory that was able to correspond to this memory capacity.

Tu-I-31

Tilt Servo Control by Intelligent Algorithm in Holographic Data Storage System

Jang Hyun Kim[1], Wooyoung Jeong[2], Hyunseok Yang[2], Jin Bae Park[2]
[1]Seoil College (Korea), [2]Yonsei Univ. (Korea)

We simulate and experiment servo control system by fuzzy system in our Holographic Data Storage System. Hence, we acquire good experimental results and performance for tilt servo control in Holographic Data Storage System.

Tu-I-32

Holographic Data Storage using Both Transmission and Reflection Type Recording

Shohei Ozawa, Hiroyuki Kurata, Kaito Okubo, Manabu Yamamoto
Tokyo Univ. of Science (Japan)

We examined the shift-multiplexed recording method that uses both transmission and reflection type recording with spherical reference beam.

Tu-I-33

Shifting Selectivity Enhanced by Astigmatism Aberration

Yeh-Wei Yu, Chih-Yuan Cheng, Chi-Shou Wu, Ching-Cherng Sun
National Central Univ. (R.O.C.)

We introduce Astigmatism in the reference beam to improve the shift selectivity in the direction of Bragg degeneracy. The experimental results is shown to demonstrate the idea.

Tu-I-34

Real-image Generation in Normal Viewing Disk-type Multiplex Holography and Design of Replication Method

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

We describe how to make real-image generation in image-plane disk-type multiplex holography. The method of direct object-image relationship is adopted for numerical analysis and the theory model of this kind of hologram is built.

Tu-I-35

Two-Channel Type Holographic Diversity Interferometry for Complex Amplitude Measurement

Jin Nozawa[1], Atsushi Okamoto[1], Yuta Wakayama[1], Akihisa Tomita[1], Masanori Takabayashi[2]
[1]Hokkaido Univ. (Japan), [2]Kyushu Institute of Technology (Japan)

We proposed two-channel type holographic diversity interferometry incorporated with a new algorithm for digital holography to compensate for imbalance of reference beams on two imagers. This technology is utilized for phase detection of holographic memory.

Tu-I-36

Lenticular Sheets Fabricated by Pinning UV Curable Polymers on the Partition Walls Formed on Polymeric Substrates

Shin Yasuda, Keishi Shimizu

Fuji Xerox Company, Ltd. (Japan)

On-demand fabrication of lenticular sheets by use of UV curable polymers is presented. This method can control the lens pitch and radius of curvature by preventing the polymer from spreading due to the pinning effect.

17:45-18:15 Break

18:15-20:45 Banquet

Wednesday, Octber 3, 2012

J: Special Session 3 "Bio Technology"

Presiders: Toshimichi Shintani (AIST, Japan)
　　　　　　 Young-Joo Kim (Yonsei Univ., Korea)

We-J-01 *Invited*

8:30 **Optical Disc Technologies Applied for Flow Cytometer with Microfluidc Sorting Chip**

Mitsuru Toishi, Masataka Shinoda

Sony Corporation (Japan)

We have developed flow cytometer (FCM) which identifies the type and size of cells and sorts the target cells. For developing FCM, we applied optical disc technologies i.e. laser technologies, optical design, and disc fabrication technologies.

We-J-02 *Invited*

8:55 **Surface Enhanced Raman Scattering Sensor using Gold Nano Coral**

Masayuki Naya[1], Shougo Yamazoe[1], Megumi Shiota[1], Mayumi Kajimura[2], Makoto Suematsu[3]

[1]FUJIFILM Corp. (Japan), [2]Japan Science and Technology Agency (Japan), [3]Keio Univ. School of Medicine (Japan)

We have developed the gold nano-coral (GNC) as a SERS substrate with high-sensitivity, high-uniformity and easy of production. In this conference, we introduce the high-sensitivity and uniformity of GNC as biosensor.

We-J-03 *Invited*

9:20 **Ultrahigh Sensitive Biomarker Sensing System based on the Combination of Optical Disc Technologies and Nanobeads Technologies**

Koji Tsujita[1], Yuichi Hasegawa[1], Masayuki Ono[1], Makoto Itonaga[1], Satoshi Sakamoto[2], Mamoru Hatakeyama[2], Hiroshi Handa[2]

[1]JVC KENWOOD Corp. (Japan), [2]Tokyo Institute of Technology (Japan)

We propose a new bio-sensing system that can quantify biomarkers in full digital manner. On the system, magnetic nano-beads is immobilized onto the disc by biomarkers and counted by using an optical pickup.

9:45-10:05 Coffee break

K: Sepcial Session 4 "Digital Archival Applications"

Presiders: Mitsuru Irie (Osaka Sangyo Univ., Japan)
Yoshinobu Mitsuhashi (JST, Japan)

We-K-01 *Invited*

10:05 **Issues and Strategy towards Long-term Digital Data Preservation**

Sunao Ishihara, Toshio Kobayashi
The Univ. of Tokyo (Japan)

Digital technology will soon inflict the crisis on the long term preservation. This situation is due to the lack of a full understanding of the threat of the digital revolution. In this paper, the issues will be summarized and discussed.

We-K-02 *Invited*

10:30 **Blu-ray Disc Based Archiving Concept in the Cloud Era**

Setsuo Murakami, Hideki Hayashi, Yoshichika Watanabe
Panasonic Corp. (Japan)

Blu-ray disc-based archive storage solution provides less migration, less energy consumption and low TCO. Blu-ray disc technology can deliver superior long-term archiving of vital data and minimize the world's environmental load and impact.

We-K-03 *Invited*

10:55   Data Storage in Medical front and Application of Optical Disk

Yukinori Okazaki, Katsuya Watanabe
Panasonic Healthcare Co., Ltd. (Japan)

Recent status of huge data application in medical front and the conditions of data storage in medical are reviewed. ADA, optical data storage media, designed for medical is explained and its suitable application is discussed.

We-K-04 *Invited*

11:20   Optical Disc Reliability Standards

Kei Yamashita
Hitachi, Ltd. (Japan)

The optical disc, writable CDs & DVDs lifetime estimation test method for long-term data storage standard ISO/IEC16963 jointly developed by ISO/IEC JTC1/SC23, ISO/TC42 & ISO/TC171 and data migration method for DVDs standard, ISO/IEC 29121 are reported.

We-K-05 *Invited*

11:45   Proposals for the Success of Expanding Optical Disc Archive

Ikuo Matsumoto
Fujiwara Rothchild Ltd. (Japan)

The total volumes of Storage and Archive are expected to rapidly increase with digital data explosion. But the position of Optical Disc Archive is not so optimistic. We should consider breakthrough for Optical Disc Archive marketing.

12:10-13:10 Lunch

13:10- Technical Tour

Thursday, October 4, 2012

L: High Density

Presiders: Kimihiro Saito (Sony, Japan)
             Atsushi Nakamura (Panasonic, Japan)

Th-L-01 *Invited*

8:30 **Detuned Polarization Continuous-wave Readout for Plasmonic Nanorod Based Multi-dimensional Optical Storage**

James W. M. Chon[1], Jooho Kim[2], Adam B. Taylor[1]
[1]Swinburne Univ. of Technology (Australia),
[2]Samsung Electronics Co. Ltd. (Korea)

We study the detuned surface plasmon resonance in polarization space for continuous-wave multilayered optical recording medium based on plasmonic nanorods. We also explore the progressively twisted NR alignment in multilayer for a potential recording medium.

Th-L-02 *Invited*

8:55 **Flexible-Optical-Disk Archival Storage (FODAS)**

Haruki Tokumaru[1], Yoshimichi Takano[2], Daiichi Koide[1], Takeshi Kajiyama[1]
[1]Japan Broadcasting Corp. (NHK) (Japan), [2]NHK Engineering Service (Japan)

Based on a concept called RAID, a prototype "archival optical-storage system"-composed of eighty 0.1-mm-thick disks housed in a palm-sized cartridge and eight disk drives providing 2-TB capacity and over-1.3-Gb/s data-transfer rate-was developed.

Th-L-03

9:20 **Near-Field Optical Recording for High-Density Flexible Optical Disk Using Solid Immersion Lens**

Daiichi Koide[1], Takeshi Kajiyama[1], Ryuji Sato[1], Haruki Tokumaru[1], Yoshimichi Takano[2], Kiyoshi Ohishi[3]
[1]NHK (Japan), [2]NHK-ES (Japan), [3]Nagaoka Univ. of Technology (Japan)

We propose a near-field optical recording flexible optical disk (NFR-FOD) by using SIL and operating gap servo precisely at high speed for 100 GB/layer of high-density and 250 Mbps of high-data transfer rate recording.

Th-L-04

9:40   Microholographic Optical Data Storage with Spatial Mode Multiplexing

Hideharu Mikami, Koichi Watanabe
Hitachi, Ltd. (Japan)

Spatial mode multiplexing for microholographic recording was proposed and demonstrated. Reflected light from two overlapped microholograms with different spatial patterns was selectively observed by applying phase-diversity homodyne detection and switching spatial mode of reference light.

Th-L-05

10:00   Multilayer Microholographic Optical Data Storage with Two-photon Recording

Ilya Sh. Steinberg, Yuri A. Shepetkin, Andrey Yu. Belikov
Siberian Branch of the Russian Academy of Science (Russia)

Results of multilayer two-photon recording of transmitting microholograms and collinear heterodyning for readout are presented. This readout method has high spatial selectivity, allows to reconstruct microholograms phase and thus to use multilevel phase data coding.

Th-L-06

10:20   38-Level Spatial Quadrature-Amplitude Modulation Recording with Double-Referential Holography

Keisuke Zukeran[1], Atsushi Okamoto[1], Masanori Takabayashi[2], Atsushi Shibukawa[1], Akihisa Tomita[1]
[1]Hokkaido Univ. (Japan), [2]Kyushu Institute of Technology (Japan)

Double-referential holography, that has extremely high tolerance for the relative displacement between diffracted signal and phantom beam for phase-detection, has been proposed. We demonstrated recording/reconstruction of 38-level spatial quadrature-amplitude modulation signals for high density recording.

10:40-11:00 Coffee break

M: Multilayer Recording

Presiders: Takashi Kikukawa (TDK, Japan)
James W. M. Chon (Swinburne Univ., Australia)

Th-M-01

11:00 **20-Layer Optical Disc Fabricated with Web Coating and Laminating Process**

Tatsuo Mikami[1], Hidehiro Mochizuki[1], Toshio Sasaki[1], Toshiyuki Kitahara[1], Hiroaki Tsuyama[1], Kenichirou Inoue[1], Masaharu Ito[2]
[1]FUJIFILM Corp. (Japan), [2]Lintec Corp. (Japan)

We prepared a 20-layer optical disc with 2-photon recording layer using "Coating and Laminating"process.The disc has high transmittance and the deepest layer can be recorded.The disc also has good meachanical characteristics.

Th-M-02

11:20 **Advanced Radial Position Control of a Recording Beam for Super Multi-Layer Disc with Separated Guide Layer**

Hiroyuki Tanaka, Kazuo Takahashi, Masakazu Ogasawara, Shoji Taniguchi
Pioneer Corp. (Japan)

We developed the advanced sled servo system for Super Multi-Layer disc with the separated guide layer. Our servo system realizes stable recording with the constant track pitch.

Th-M-03

11:40 **A Feasibility Study of 25GB/layer Dynamic Recording by using Two-photon Material and Heat-mode Bump Formation Method**

Toshio Sasaki, Hidehiro Mochizuki, Tatsuo Mikami, Toshiyuki Kitahara, Hiroaki Tsuyama, Kenichirou Inoue
FUJIFILM Corp. (Japan)

Recording mechanism of the novel heat mode bump formation method was described. A dynamic recording test of 17PP signal with the shortest mark length of 2T=150nm and 320nm-track pitch to two-photon material was examined.

Th-M-04

12:00 **Physical Format for a Guide-layer Optical Disc**

Akihito Ogawa, Takashi Usui, Hideaki Okano, Keiichiro Yusu, Kazuo Watabe
Toshiba Corp. (Japan)

This paper proposes a physical address format suitable for the guide layer of the multilayered disc. The bit error rate of the address information is evaluated using a replicated disc sample.

12:20-13:50 Lunch

N: Drive Technology and Signal Processing

Presiders: Satoru Higashino (Sony, Japan)
No-Cheol Park (Yonsei Univ., Korea)

Th-N-01

13:50 HDTV Playback Demonstration of Holographic Data Storage System using Wavefront Control & GPU-Based Post-Processing

Nobuhiro Kinoshita[1], Norihiko Ishii[1], Tetsuhiko Muroi[1], Koji Kamijo[1], Toshio Ando[2], Kazuyoshi Masaki[2], Takehiro Shimizu[2], Hiroshi Kikuchi[1]
[1]NHK (Japan), [2]Nippon Steel Chemical Co., Ltd. (Japan)

We successfully demonstrated a HDTV video playback using a holographic data storage system that integrates a wavefront control method, GPU-based post-processing, and a medium that had a large M/# and constant high sensitivity.

Th-N-02

14:10 Two Dimensional Soft Output Viterbi Algorithm with Extrinsic Information for Holographic Data Storage

Keunhwi Koo, Soo-Yong Kim, Sang Jun Lee, Sang Woo Kim
Pohang Univ. of Science and Technology (Korea)

We propose detection method using 2D SOVA for holographic data storage. The method can improve both BER performance and computational complexity owing to the use of extrinsic information and 2D PR target including diagonal elements.

Th-N-03

14:30 Loop Gain Adjustment Using Embedded Dynamic Signal Analyzer

Soo-Yong Kim, Keunhwi Koo, Sang Jun Lee, Sang Woo Kim
Pohang Univ. of Science and Technology (Korea)

A new loop gain adjustment based on the EDSA is proposed for calibration of a control system. The algorithm can cover effects of the model uncertainty because the compensation gain is estimated by system identification.

PD: Post Deadline Papers

Presiders: Ryuichi Katayama (Fukuoka Institute of Tech., Japan)
Haruki Tokumaru (NHK, Japan)

14:50   Th-PD-01
15:05   Th-PD-02
15:20   Th-PD-03
15:35   Th-PD-04
(The best 4 post deadline papers are orally presented.)

15:50-16:10 Award & Closing

AUTHOR INDEX

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| Narita Airport | — Train (60 min.) → | Tokyo Station | — Train (5 min.) → | Shimbashi Station | to YURIKAMOME |
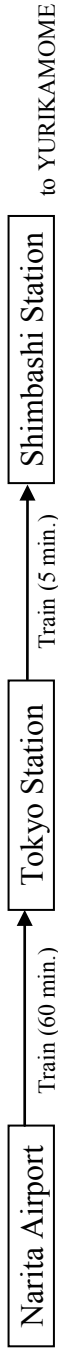
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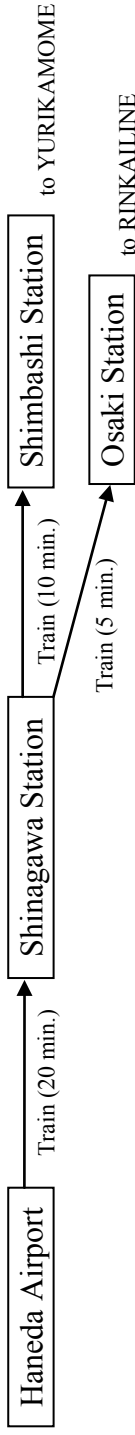
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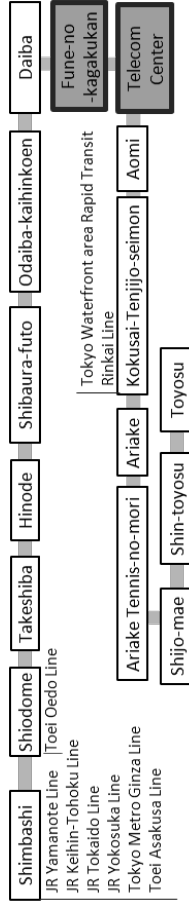
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To Shinjuku
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JR Yokosuka Line
JR Shonan-Shinjyuku Line

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JR Keihin-Tohoku Line
Tokyu Oimachi Line

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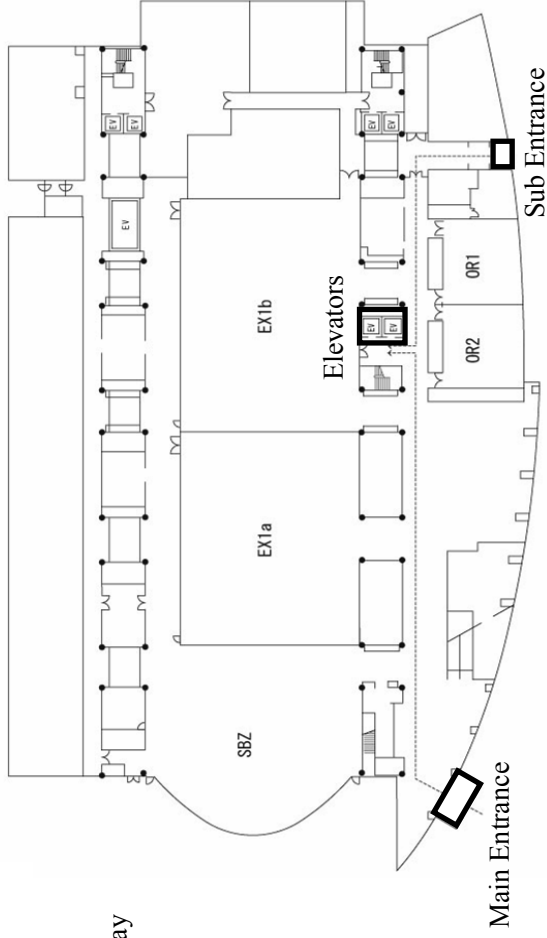
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10:00 – 17:00 Everyday except Tuesday

Sub Entrance Open
8:30 – 10:00 and 17:00 – 21:00
All day on Tuesday (8:30 – 21:00)

MIRAIKAN 7TH FLOOR

Oral Session Hall (HAL)
Monday – Thursday

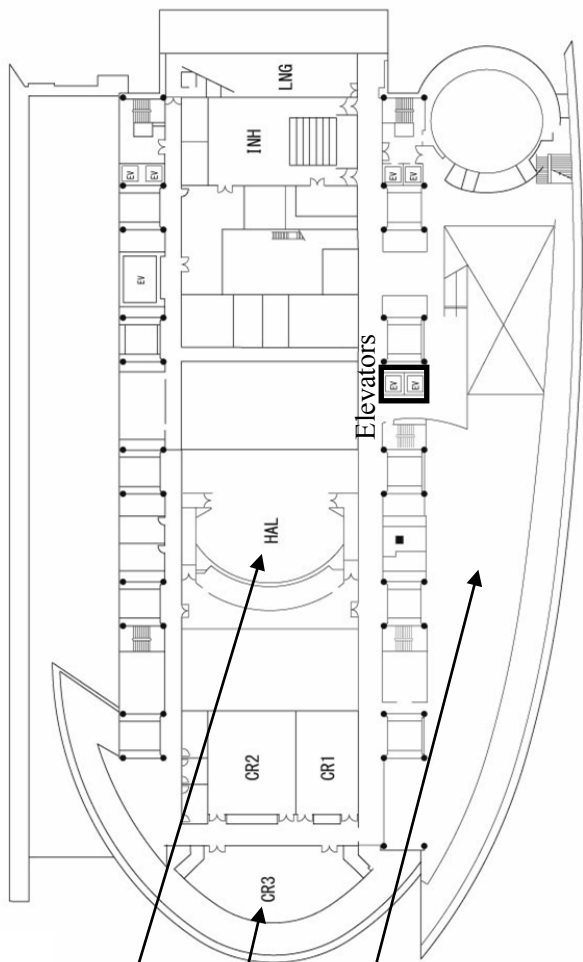Poster Session Hall (CR3)
Tuesday

Restaurant (LA TERRE)
✔ Get-Together
  Sunday 17:00 – 19:00
✔ Banquet
  Tuesday 18:15 – 20:45

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