ADVANCE PROGRAM

IN COOPERATION WITH

IEEE Photonics Society

Optical Society of America (OSA)

SPIE

The Institute of Electronics, Information and Communication Engineers (IEICE)

The Chemical Society of Japan

Information Processing Society of Japan

The Institute of Electrical Engineers of Japan

The Institute of Image Electronics Engineers of Japan

The Institute of Image Information and Television Engineers

The Japan Society of Precision Engineering

The Laser Society of Japan

INTERNATIONAL SYMPOSIUM ON OPTICAL MEMORY 2009

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NAGASAKI BRICK HALL, NAGASAKI, JAPAN October 4–8, 2009

SPONSORED BY

- The Japan Society of Applied Physics (JSAP)
- The Magnetics Society of Japan (MSJ)
- Optoelectronic Industry and Technology Development Association (OITDA)

Deadlines Post Deadline Papers: August 15, 2009 Advance Registration: September 4, 2009

http://www.isom.jp/

Symposium Schedule





WELCOME TO ISOM'09

WELCOME STATEMENT FROM THE ORGANIZING COMMITTEE CHAIRPERSON

The 19th International Symposium on Optical memory (ISOM'09) will be held in Nagasaki, Japan

October 4-8, 2009



On behalf of the International Symposium on Optical Memory (ISOM) organization committee, I am delighted to welcome all of you to the ISOM'09 in Nagasaki.

Remarkable progresses of optical memory technology and industry have been made since the first ISOM meeting in 1985. Sales volume of DVD drive, for example, has reached to 500 million unit per year in 2008 and the market expansion speed of the drive has been almost the same as that of the digital mobile phone. The third generation optical memory called Blu-ray has already got on track of high volume market. As major technologies supporting the drive and media have been presented in the past ISOM meetings, ISOM has really contributed to the greatest product innovation of the world.

Past 30 years, optical memory technology has been developed mostly focusing on high density and this year is the starting year of the fourth generation technology. But I would like to ask all of ISOM'09 participants to pay attention to that this year is not only the starting year of the new technology itself but also starting year for new application development in the green market. We believe that optical memory is undoubtedly one of the best candidates as the green technology for data archive application and huge market will be opened in the world by year 2015-2020.

Open innovation is the best way to accelerate development speed of technologies. Program committee of ISOM'09 will propose the technology roadmap as a special feature targeting the green market application. I sincerely hope all of ISOM participants to join and discuss the road map.

Welcome to ISOM'09 meeting in Nagasaki and the ISOM Committees hope that all of you enjoy the meeting.

Korchi Ogawa

Koichi Ogawa ISOM'09 Organizing Committee, Chairperson

INTRODUCTION

The 19th International Symposium on Optical Memory (ISOM) will be held from Oct. 4th to 8th, 2009 at Nagasaki Brick Hall in Nagasaki City, 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. In 2006, ISOM Optical Memory Roadmap final report highlighted the milestones and breakthroughs in next generation optical data storage research, namely, holographic recording, multilayer recording, two-photon, Super-RENS and near-field technologies. The interface specifications between future technologies and elemental technologies were also discussed. In 2009, the second version of ISOM Optical Memory Roadmap focusing on applications, such as archival systems, audiovisuals, inter-cross business market and so on, will be opened. This is the big chance for participants to discuss new optical memory systems as well as high density technologies or future technologies.

The symposium venue, Nagasaki Brick Hall, is centrally located in Nagasaki City. Since opened by the Portuguese in 1571, Nagasaki flourished as a busy trading port and center for Christian missionary activities. In 1641, after the adoption of a national ban on Christianity and the expulsion of the Portuguese, the Dutch trading port and Chinese settlement in Nagasaki became Japan's only points of contact with the outside world. This monopoly lasted more than 200 years and created in Nagasaki a unique blend of cultures and a liberal atmosphere unheard of in other parts of the country.

The atomic bomb catastrophe turned a dark page in Nagasaki's turbulent history, but the city is now a center of peace blessed with the beauty of nature and numerous places of historical and cultural interest which still exude the rich flavor of old Nagasaki.

SCOPE OF THE SYMPOSIUM

ISOM'09 will discuss the current status of optical memory system design and applications, together with new developments in the areas of media, lasers, basic theory including computer simulation, system sub-components, and a range of future technologies. In ISOM'09, the scope of the symposium was extended to accept a wide range of researches and technologies related to optical memory. In addition to ordinary contributed papers, a number of invited papers in cutting edge will be presented. Topics to be covered in this symposium include, but are not restricted to:

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

REGISTRATION

Advance Registration & Hotel Reservations

Nippon Travel Agency Co., Ltd. (NTA) has been appointed as secretariat for Advance Registration and Hotel Reservations for ISOM'09.

If you have any questions, please contact:

ISOM'09 Desk c/o Nippon Travel Agency Co., Ltd. Kyushu Event & Convention Center Attention: Miyaoka (Ms.) 5th Fl. Chikuho Bank Bldg., 2-2-1, Maizuru, Chuo-ku, Fukuoka 810-0073, Japan Tel : +81-92-732-6363 Fax : +81-92-715-2827 e-mail : fukuoka_ec@nta.co.jp

Onsite Registration

The registration desk will be located at the Lounge of the International Conference Hall in Nagasaki Brick Hall from Sunday through Wednesday during the following hours.

Because the Registration Desk in the morning on October 5 is supposed to be so crowded, it is recommended to finish your registration within October 4.

Sunday, Oct. 4:	12:00 - 17:00
Monday, Oct. 5:	8:30 - 13:00
Tuesday, Oct. 6:	8:30 - 13:00
Wednesday, Oct. 7:	8:15 - 13:00

REGISTRATION FEES

Туре	Before / On Sept. 4, 2009	After Sept. 4, 2009
Regular	50,000JPY	60,000JPY
Student & Retiree	3,000JPY	3,000JPY
Banquet	5,000JPY	7,000JPY
Additional Technical Digest	5,000JPY	5,000JPY
Tutorial Seminar	5,000JPY	5,000JPY
Application Roadmap Report	5,000JPY	5,000JPY

*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 for Regular but does not include the technical digest for Student and Retiree. When the student participates, Student ID might be confirmed.

The Application Roadmap Report will be distributed on Oct. 6 and 7.

Registration and Payment

Those who wish to attend ISOM'09 should access to ISOM website (http://www.isom.jp/), where the procedure of the registration is described. Online registration is highly recommended. In case where online registration is not convenient, you can register by submitting the Registration Form via Facsimile.

The registration website will be opened until **September 4** and the advantage of early registration rate is available by **September 4**, 2009. Please note that payment deadline of early registration will be set until **September 15**.

From **September 5** to **September 24**, 2009, you can register only by **Facsimile** with **Creditcard payment**.

Payment should be made in Japanese Yen by bank transfer (inside Japan only) or credit card (VISA, AMEX, JCB and Master Card). The account of the bank transfer will be given after the registration is accepted. No personal checks will be accepted. If unable to pay by these methods, please contact Nippon Travel Agency for alternative arrangements.

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

Registration Cancellation

The cancellation fee amounted 5,000JPY (Only Regular Type) will be deducted from the refund. Cancellation should be made by also accessing to the registration page in ISOM homepage or in writing to Nippon Travel Agency, but no cancellation will be admitted after **September 15, 2009**.

INSTRUCTION FOR SPEAKERS

<ORAL PRESENTATION>

► Time assigned for:

Туре	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 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.

- ► The papers are divided into two sessions: Poster Session I (13:55-15:25) and Poster Session II (15:55-17:25).
- ► Each author is provided with a 210 cm high x 150 cm wide poster space on which a summary of the poster paper is to be displayed on the board.
- ► 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 35word 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 service 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 20 to August 15, 2009.

Authors will be notified about the beginning of September, 2009 whether their papers are accepted. 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.

TypeTotalPresentationDiscussionPost Deadline15 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 August, 2010. The authors who will have, by themselves, presented papers at ISOM'09 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 31, 2010. Submitted papers will be reviewed based on the JJAP standard.



SPECIAL PROGRAMS

(1) Tutorial Seminar

The Tutorial Seminars (T-1, 2) 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/). Onsite registration is only available subject to the vacancies. You are advised to pre-register due to the limited class size.

- ▶ Date & Time: Sunday, October 4, 13:30-17:00
- ▶ Place: Nagasaki Brick Hall, Meeting Room 1, 2
- Fee: Regular 5,000JPY (with a textbook) Student No charge (no textbook)
 (After the deadline of pre-registration, the fee must be paid at

the Registration Desk, cash only.)

- ► Language: English
- ▶ Program:
 - **T-1** 13:30-15:00

3D Display Technologies

Prof. Hiroshi Yoshikawa (Nihon Univ., Japan)

<u>Abstract</u>: After reviewing basics of 3D imaging, we move to the various types of 3D display technology, which include stereoscopic, lenticular, integral photography, super multiviews, volumetric and holography. Trends of research and development are also reviewed.

<u>Instructor Biography</u>: Professor Hiroshi Yoshikawa joined the faculty at Nihon University in 1985 where he is currently a professor of Electronics and Computer Science. His research interests are in computer-generated holograms, holographic video, holographic printer and computer graphics.

15:00-15:30 Break

T-2 15:30-17:00

Fundamental Solutions to Achieve Ultra-High Density Optical Recording

Dr. L. P. Shi (DSI, Singapore)

<u>Abstract</u>: The possible solutions to increase density/capacity are introduced. The ultra high density optical recording can be achieved by further reducing spot size to overcome diffraction limit or by volumetric optical recording.

Instructor Biography: Dr. Shi received his Dr. of Science degree from Cologne University, Germany in 1992. He joined DSI in 1996 and now is senior research scientist, division manager of Optical Materials & System division. His research areas are optical storage, solid state memory, and artificial cognitive sensor and memory.

(2) Social Programs

Get-Together Reception

- ► Date & Time: Sunday, October 4, 17:00–18:30
- Place: International Conference Hall Lounge, Nagasaki Brick Hall, 3rd Floor
- ► Fee: No charge
- All attendees including spouses are invited to the Get-Together Reception.

Banquet and Entertainment

Banquet Reception

- ▶ Date & Time: Tuesday, October 6, 18:30–20:30
- Place: In front of the statue of MIURA Tamaki in Glover Garden or ANA Hotel Nagasaki Gloverhill (in case of rain)
- ► Fee: Advance registration 5,000JPY Onsite registration 7,000JPY
- ► Access: Take a streetcar to Oura Tenshudo-shita. (approx. 20 minutes from Nagasaki Brick Hall). Walk to Glover Garden (approx. 8 minutes) or ANA Hotel Nagasaki Gloverhill (3 minutes). The Chartered streetcar is being planned for participants. Detailed information will be guided with onsite flier.
- ► The 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).

Banquet Entertainment

Opera songs from the "Madame Butterfly"

Madame Butterfly is an opera composed by Giacomo Puccini. The locale of this opera is Nagasaki. The singer belonging to Nagasaki Prefecture Opera Association is going to sing.

(3) Technical Exhibition

Technical Exhibition is organized. The optical disc drives, media, components and application software from the leading companies and laboratories will be presented.

▶ Date &	Time:	Monday, Oct. 5	10:00-17:00
		Tuesday, Oct. 6	10:00-17:00
		Wednesday, Oct. 7	10:00-13:00
► Place:	Inte	rnational Conference H	lall, Lounge,
	Nag	asaki Brick Hall, 3rd fl	oor

(4) Technical Tour

cennical fo	-ui
Date & Tin	ne: Wednesday, October 7, 13:00-17:00
Place:	Mitsubishi Heavy Industries Ltd. Nagasaki Shipyard & Machinery Works
Cost:	No charge
Schedule: [13:00] Bri Bridge)) Machinery Ohashi (G Shipyard [17:00] JF Kokaido (N	ck Hall → Bus (via Megami-Ohashi (Goddess → [13:50-14:20] Nagasaki Shipyard & Works, Koyagi Plant → Bus (via Megami- oddess Bridge)) → [15:00-16:30] Nagasaki & Machinery Works, Museum → Bus → R Nagasaki Station → Bus → Nagasaki-shi Nagasaki Civic Auditorium)

** Advance registration is required. The registration will be closed as soon as applicants reach to 40 people.

Mitsubishi Heavy Industries Ltd. Nagasaki Shipyard & Machinery Works

Mitsubishi Heavy Industries Ltd. Nagasaki Shipyard & Machinery Works was established in 1857 as Japan's first warship repair facility, under the name, Nagasaki Yotetsusho Foundry.

Since then they have developed the two related businesses of shipbuilding and machineries, producing not only many of Japan's greatest ships but also a range of power generating plants and other machinery.

Koyagi Plant is the largest plant in Nagasaki Shipyard & Machinery Works, completed in 1972. Here, LNG carriers, LPG carriers and large tankers are built. Specialized boiler shops, the largest in the country, have an annual manufacturing capacity of 6,120 MW. These state-of-the-art facilities produce top quality, top performance boilers in large-size modules of up to 3,800 tons on highly automated production lines.

* The festival "Nagasaki Kunchi" will be taken place in Nagasaki City between October 7th and 9th. Please enjoy this festival after the technical tour.

Nagasaki Kunchi is a grand festival for the God Ujigamisama, the God of Nagasaki's Suwa Shrine. "Kunchi" comes from "ku-nichi", the Japanese way of saying the 9th day of the month. The festival began in 1634, with two dancing girls performing a dance offering at the shrine. The festival has over 370 years of history. The most famous attraction is "Dragon dance".

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

(5) Seminar for Nagasaki Citizen

Seminar for Nagasaki citizen is offered in the afternoon of the first day. Admission is free. After filling the capacity, the seminar room will be closed.

- ▶ Date & Time: Sunday, October 4, 13:30-17:00
- ▶ Place : International Conference Hall
- ► Fee : No charge
- Language : Japanese
- ► Lecture :

"The fluorescence in our lives"

"The history of Diamond Vision with challenge and vision for future" Nobuo Terazaki (Mitsubishi)

「長崎から生まれ、世界最先端を走る大型映像表示装置 の技術と未来について」

寺崎 信夫(三菱電機株式会社)

"The roles of a solar battery toward realization of lowcarbon society"

Hiromu Takatsuka (Mitsubishi Heavy Industries) 「低炭素化社会実現に向けた太陽電池の役割」 高塚 汎(三菱重工業株式会社)

 "Optical Disc, its 30-years history and upholding science"
 Harukazu Miyamoto (Hitachi)
 「発展し続ける光ディスク」 ~ 30 年のあゆみとサイエンス~ 宮本 治一 (株式会社日立製作所)

(6) Special Lecture for Students in Nagasaki and Sasebo

Special lectures for students in Nagasaki and Sasebo will be held at one college and one high school. The lectures provide them with the great opportunity to learn much about the basic principle of optical disks such as CD, DVD, Blu-ray and also the everyday life of engineers of leading electronics companies in Japan.

►	Lecture Tit	tle: "Basic Principle of Optical Disks"
		「光ディスクの原理」
	Lecturers:	T. Kikukawa (TDK), 菊川 隆
		M. Itonaga (JVC KENWOOD), 糸長 誠
		M. Toishi (Sony), 外石 満
	Places:	1. Omura Technical High School

長崎県立大村工業高等学校

2. Sasebo National College of Technology 佐世保工業高等専門学校

(7) Excursion

Course #1: Arita Pottery Tour

► Date & Time: Wednesday, October 7 9:30-16:40

Tour Schedule:
 [9:30] Venue → [10:45-12:00] Kyushu Ceramic Museum
 → [12:10-13:10] Yasuna/Japanese Dishes → [13:30-14:30] Porcelain Painting Experience and Shopping →
 [15:00] Pottery of Sakaidakakiemon → [16:40] Venue

- ► Fee: 8,000JPY per person
- ► The minimum number of applicants required for this tour operation is 20 people.

Course #2: Unzen National Park Tour

- ► Date & Time: Wednesday, October 7 9:00-16:30
- Tour Schedule:
 [9:00] Venue → [10:30] Nita-toge Pass/Volcanic fumes →
 [13:00] Unzen Kanko Hotel/Japanese Dishes → [14:00-14:30] Shimabara Reconstruction Museum → Shopping
 → [16:30] Venue
- ► Fee: 8,000JPY per person
- The minimum number of applicants required for this tour operation is 20 people.

Course #3: City Tour (Course A)

- ► Date & Time: Wednesday, October 7 13:30-17:00
- ► Tour Schedule: [13:30] Venue → [13:50-14:50] Nagasaki Atomic Bomb Museum → [15:00-15:10] Hypocenter → [15:25-15:45] Urakami Cathedral → [15:55-16:15] Nagai Takashi Memorial Museum (Nyokodo) → [16:30] Peace Park → [17:00] Venue
- ► Fee: 2,500JPY per person (no meal)
- ► The minimum number of applicants required for this tour operation is 15 people.

Course #4: City Tour (Course B)

- ► Date & Time: Wednesday, October 7 13:30-18:00
- ► Tour Schedule: [13:30] Venue \rightarrow [14:15-16:30] Glover Garden \rightarrow [16:40-17:10] Oura Catholic Church \rightarrow [17:30-17:50] Dejima \rightarrow [18:00] China Town
- ► Fee: 3,500JPY per person (no meal, transfer fee is not included)
- ► The minimum number of applicants required for this tour operation is 15 people.

Course #5: Kumamoto / Aso / Dazaifu Tour

- ► Date & Time: Wednesday, October 7, 9:30 Thursday, October 8, 17:45 (at Fukuoka Airport)
- ► Tour Schedule:

Oct. 7, [9:30] Venue \rightarrow Unzen dake (view from bus) \rightarrow [12:00-13:00] Mizunashi Honjin/Lunch \rightarrow [13:20-13:55] Shimabara Harbor/Ferry \rightarrow [14:25-14:30] Kumamoto Harbor \rightarrow [15:00-16:30] Kumamoto Castle \rightarrow [17:00] Hotel /Single (Breakfast included)

Oct. 8, [9:00] Hotel \rightarrow [10:40-11:10] Mt. Aso \rightarrow [11:30-12:30] Kusasenri/Lunch \rightarrow Daikanbo (view from bus) \rightarrow [14:20] Kuju IC \rightarrow [15:30] Dazaifu IC \rightarrow [15:45-16:45] Dazaifu Tenmangu \rightarrow [17:45] Fukuoka Airport

- ► Fee: 25,000JPY per person
- ► The minimum number of applicants required for this tour operation is 30 people.

HOTEL ACCOMMODATIONS

A block of rooms has been reserved by Nippon Travel Agency Co., Ltd. for the convenience of the participants. The rooms are to be reserved on a first-come, first-served basis.

To ensure your reservation at the reduced convention rate, please make your hotel reservation today!

Especially, hotels in Nagasaki City are very crowded because of the festival season in October. It is recommended for you to reserve the room as soon as possible.

How to make hotel reservations

Those who wish to make hotel reservations should have access to ISOM homepage: http://www.isom.jp/, where the procedure of the hotel reservation is described. ONLINE reservation should be completed no later than **September 6 (Sun), 2009** with the payment of hotel charge and handling charge (525 yen per room). In case where online reservation is not convenient, you can reserve by submitting the Reservation Form via Facsimile.

Payment

Payment must be completed in **Japanese Yen** by bank transfer (inside Japan only) or credit card when you make reservations (For details, see Registration). Payment deadline will be set until September 15.

Hotel Cancellations

Any kind of cancellation or reservation change must be submitted in writing to ISOM'09 Desk.

In case of cancellation of hotel reservation, your deposit will be refunded after deducting bank charge, commission and cancellation fee as follows. Please note that the handling charge cannot be refunded.

- 4 days or more prior to the date of arrival: No charge
- 3-1 days before the first night of your stay: 20% of one night room charge
- Check in day: 50% of one night room charge
- Cancellation without notice: 100% of one night room charge

Hotel	Code	Туре	Rate (JPY)	Access from JR Nagasaki Sta.	Internet
Best Western	1-S	Single	14,500		
Premier Hotel Nagasaki	1 - T	Twin	12,500	8 min. walk	OK
ANA Hotel	2-S	Single	14,000		
Nagasaki Gloverhill	2-T	Twin	12,000	7 min. by Taxi	OK
Hotel Monterey	3-S	Single	12,600	5 min by Tavi	OV
Nagasaki	3-T	Twin	11,550	5 mm. by Taxi	UK
Victoria Inn	4-S	Single	11,500	5 min by Tavi	OV
Nagasaki	4-T	Twin	10,500	5 mm. by Taxi	UK
Hotel JAL City	5-S	Single	9,900	5 min by Tavi	OV
Nagasaki	5-T	Twin	7,900	5 mm. by Taxi	UK
APA Hotel <nagasaki- Ekimae></nagasaki- 	6-S	Single	9,000	1 min. walk	OK
APA Hotel <nagasaki- Ekiminami></nagasaki- 	7-S	Single	9,000	7 min. walk	OK
Nagasaki	8-S	Single	8,700	5 min by Tavi	OV
Washington Hotel	8-T	Twin	8,500	5 mm. by Taxi	ŰK
JR Kyushu Hotel	9-S	Single	7,740	0 min walk	OK
Nagasaki	9-T	Twin	7,140	0 IIIII. waik	ŰK
New Urakami	10-S	Single	6,700	3 min by Train	OK
Hotel	10-T	Twin	6,200	5 min. by Halli	UK
Comfort Hotel	11-S	Single	5,500	10 min walk	OK
Nagasaki	11 - T	Twin	4,250	10 IIIII. walk	UK

* The above rates are per room including service charge and 5% consumption tax. Breakfast included.

* No reservation will be made without the payment of hotel charge and handling charge.

GENERAL INFORMATION

(1) Official Language

English is the official language of ISOM'09.

(2) Message Board

Official Information Board and Message Board will be set near the Registration Desk. Message will be taken during registration hours on Sunday through Wednesday 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'09 Symposium Office. The telephone number for the Symposium Office at the Conference Site is shown at the back cover.

(3) VISA Requirement

You may be requested to show your visas upon entry to Japan. Please check with your governmental agency.

(4) Lunches

Lunches will not be served by the ISOM'09 Symposium Office. All the attendees can have lunch not only at a restaurant on the 1st floor in Nagasaki Brick Hall but at some restaurants in the "COCOWALK" facility which is within a few minutes' walk.

http://cocowalk.jp/guide/access.html (Japanese text only)

(5) Parking

There are 152 parking sections around Nagasaki Brick Hall. Guests may park there. Parking time: 8:00-22:00 Parking fee:130JPY per first 30 min and Afterwards 120JPY per other 30 min.

(6) Introduction of Nagasaki

The city of Nagasaki is located in the northwestern part of the island of Kyushu in the extreme western part of Japan. Nagasaki is particularly close to the Korean peninsula and China and serves as Japan's window to China and other countries of Asia.

If you want to know more about Nagasaki, please refer to the following website.

http://www.at-nagasaki.jp/foreign/english/about/

"Nagasaki City Tourism Guide Amazing Nagasaki" (Your complete information source on Nagasaki Things to do, things to enjoy, things to know!)

ISOM'09 COMMITTEES

Organizing Committee

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TECHNICAL PROGRAM

October 5, 2009 (Monday)

Opening and Keynote Session

Presider : H. Tokumaru (NHK, Japan) Program Committee, Chairperson

Mo-A-01

(9:00) Opening Remarks

- K. Ogawa (Univ. of Tokyo, Japan) Organizing Committee, Chairperson
- M. Shinoda (Mitsubishi, Japan) Steering Committee, Chairperson

Mo-A-02 (Keynote)

(9:10) The Prospect of the Optical Storage Industry and Technology

T. Matsui (Advanced Technology Initiative, Japan)

The centralized data processing system would be good but not perfect solution. Key concerning point is not only economic efficiency but also human value. We have to concern the optical storage can get its right value in the paradigm shift.

Basic Theory and New World

Presiders : C. -T. Chong (DSI, Singapore) D. P. Tsai (Nat'l Taiwan Univ., Taiwan)

Mo-B-01 (Invited)

(9:40) Plasmonic Optical Data Storage

M. Mansuripur*, A. R. Zakharian**, S. -H. Oh***, R. J. Jones*, A. Lesuffleur***, A. Kobyakov**, H. Im***, N. C. Lindquist***, J. V. Moloney* (*The Univ. of Arizona, USA, **Corning Inc., USA, ***Univ. of Minnesota, USA)

The digital information stored in each bit-cell in plasmonic data storage modifies the spectrum of the femtosecond light pulse. We present theoretical as well as experimental results that confirm the potential of plasmonic nano-structures.

Mo-B-02 (Invited)

(10:05) Surmounting Optical Diffraction Limit using Plasmonics

B. Lee, S. Kim, Y. Lim, H. Kim, J. Park (Seoul National Univ., Korea)

We discuss a variety of plasmonic devices which can be utilized in optical data storage. Especially, we will concentrate on ways to render highly focused spot overcoming optical diffraction limit for high density.

Mo-B-03 (Invited)

(10:30) Storage Technology using Plasmonics

J. Kim (Samsung Electronics, Korea)

Surface plasmonic storage technology will be presented. As a good candidate, a dynamic selective polarization recording technology using surface plasmon phenomenon will be reported. Using the surface plasmon phenomenon with Au nano-rods structure, the dynamic polarization recording and readout will be described.

Break (10:55 - 11:15)

Mo-B-04 (Invited)

(11:15) MEMS Technologies for Optical Storage Application

K. Hane (Tohoku Univ., Japan)

MEMS technologies for the fabrication of micro optical and mechanical components are presented. Variable optical system and integration of components are discussed for the application to optical storage system.

Mo-B-05 (Invited)

(11:40) Understanding of Phase-Change Materials based on the First Principle Computer Simulation

J. Tominaga, K. Alexander, R. Simpson, P. Fons (AIST, Japan)

Ge-Sb-Te and Sb-rich alloys have widely been used for rewritable optical disks without the full understanding of the switching mechanism. We discuss several models of Ge-Sb-Te alloys based on the first principle computer simulation to provide a new insight.

Lunch (12:05 - 13:35)

High Density Recording I

Presiders : M. Mansuripur (Univ. of Arizona, USA) K. Ueyanagi (JST, Japan)

Mo-C-01

(13:35) Bit-Error-Rate Evaluation of Readout Signal from Super-RENS-ROM Disc with InSb Film

K. Nakai*, M. Ohmaki*, N. Takeshita*, L. Poupinet**, B. Andre**, B. Hyot** (*Mitsubishi Electric, Japan, **CEA-LETI, France)

Readout characteristics of super-RENS-ROM disc with InSb film were evaluated using super-RENS readout system with optical pickup and H/W signal processor. bER of 6.0E-5 was confirmed with random patterns having minimum pit length of 80nm.

Mo-C-02

(13:55) Improved Gap Error Lens Position (i-GELP) in Gap Servo NFR

I. -G. Han, S. -H. Lee, S. -W. Ha, D. -H. Son, J. -K. Seo, I. -H. Choi, B. -H. Min (LG Electronics, Korea)

We divide the gap error signal to get not only tilt error signal but also TE DC offset compensation signals by applying proposed wedge prism in front of GES PD.

Mo-C-03

(14:15) High Resolution SIL-based Near-Field Recording with Annular Aperture

H. Moon, Y. -J. Yoon, N. -C. Park, Y. -P. Park, K. -S. Park (Yonsei Univ., Korea)

We performed an experiment over the annular aperture by measuring the beam profile directly. And through this research, we could verify the improvement of the optical characteristics by applying this technique to the SIL-based NFR.

Mo-C-04

(14:35) High Density Rewritable Media for Near-Field Optical Recording

J. -H. Kim, S. -H. Lee, J. -S. Lee, B. -S. Kwak, J. -K. Seo, I. -H. Choi, B. -H. Min (LG Electronics, Korea)

High density rewritable NFR media is prepared with coating cover-layer and the writing and reading characteristics are investigated.

Mo-C-05

(14:55) Experimental Study of the Contamination Mechanism of Near Field Recording System with Conical Solid Immersion Lens

M. H. Choi*, S. H. Han*, Y. C. Rhim*, J. K. Seo**, I. H. Choi**, B. H. Min** (*Yonsei Univ., Korea, **LG Electronics, Korea)

The contamination on the SIL is experimentally observed. It is found that SIL is contaminated by not only the particles whose size is tens of nm and but the lumps of relatively large contaminants.

Mo-C-06

(15:15) Improved Robust Control Algorithm using Disturbance Observer for SIL-Based Near-Field Recording System

W. -H. Shin*, J. -G. Kim*, H. -W. Hwang*, K. -S. Park*, N. -C. Park*, H. Yang*, Y. -P. Park*, J. M. Park**, D. H. Son**, J. K. Seo**, I. H. Choi** (*Yonsei Univ., Korea, **LG Electronics, Korea)

In this research, we propose improved robust controller that consists of the disturbance observer for SIL based NFR system to reduced residual error and defend external disturbance without collision between the SIL and the disk.

- Mo-C-07
- (15:35) Experimental and Theoretical Analysis of Heat Assisted Magnetic Recording with Different Media Structures

H. -S. Oh, D. -S. Lim, M. -H. Shin, Y. -J. Kim (Yonsei Univ., Korea)

Different media structures on HAMR application were evaluated experimentally and theoretically to confirm better magnetic recording performance and opto-thermal conversion of SPAH and DTM media, compared to the continuous media.

Break (15:55 - 16:15)

Media and Material Science

Presiders : J. -H. Kim (Samsung, Korea) N. Yamada (Panasonic, Japan)

Mo-D-01 (Invited)

(16:15) Development of Photo-responsive Fluorescent Molecular Materials for Future Optical Memory Medium

T. Kawai (NAIST, Japan)

Photo-responsive molecular materials showing modulation of fluorescence emission are developed for use as an active material in future 3D high density memory. Novel photochromic lanthanide complex exhibited reversible fluorescence modulation upon light irrdiation with non-destructive read-out capability.

Mo-D-02 (Invited)

(16:40) Triple-layer Rewritable Disc with Sb-based Phasechange Material

H. Shingai, M. Kosuda, T. Kato, Y. Takagi, H. Hirata (TDK, Japan)

We fabricated Triple-layer rewritable disc with Sbbased phase-change material and measured the recording characteristics at 33.4 GB/layer and 72 Mbps data recording rate. The disc stricture and other characteristics will be shown at the conference.

Mo-D-03

(17:05) First Proposal of 100 GB Rewritable Triple-layer Optical Disk using a GeTe-rich GeSbTe Film and a New Dielectric Film with a High Refractive Index

T. Nishihara, A. Tsuchino, Y. Tomekawa, H. Kusada, R. Kojima, N. Yamada (Panasonic, Japan)

The recording-capacity of 33.4GB/layer and the triple-layer structure were enabled by a high-contrast GeSbTe film and a TiO_2 -based film, respectively. A sufficiently low SER, <1E-4, was confirmed for every layer at the data-rate of 72Mbps.

Mo-D-04

(17:25) Thermal Recording for 200GB SIL Disc Mastering

N. Yamaoka, S. Murakami, Y. Sugawara, S. Ohshima, T. Takishita, F. Yokogawa (Pioneer, Japan)

We chose a dielectric as the recording material of the thermal recording. We confirmed that 200GB density data could be recorded with this material. As we expected, recorded pit shape was so sharp.

Mo-D-05

(17:45) 33.4GB/layer Recording with Adaptive Write Strategy for 100GB Rewritable Triple-Layer Disc A. Nakamura, I. Kobayashi, K. Narumi, S. Furumiya, N. Miyagawa (Panasonic, Japan)

This paper proposes a new adaptive write strategy to obtain high quality signal for recording density of 33.4GB/layer onto high transparent recording layer, and realized 100GB capacity of rewritable triplelayer disc.

Mo-D-06

(18:05) High Capacity SuperRENS-ROM Disc with InSb Active Layer: Toward 76 GB Hybrid Dual Level B. Hyot, S. Olivier, F. Laulagnet, M. -F. Armand, B. Andre (CEA-LETI, France)

We propose a review paper on superRENS ROM discs based on InSb. We will report the characteristics of our 53 GB discs as well as the 76 GB potential capacity of a hybrid dual level.

Components and Nano Fabrication

Presiders : H. Miyamoto (Hitachi, Japan) T. Shimano (Hitachi Maxell, Japan)

Mo-E-01 (Invited)

(18:25) Reduction Technique of Interlayer Cross-talk in Reading Multi-layer Blu-ray Disc with the Use of Longitudinal Grating in Optical Pickup

S. Kimura, T. Ide, E. Tatsu, T. Kurokawa, K. Watanabe, Y. Anzai, T. Shintani (Hitachi, Japan.)

We show that a grating filter in the pickup return path is effective in reducing the fluctuation of the tracking-error signal induced by interlayer cross-talk and mention a countermeasure against a decreased RF signal.

Mo-E-02 (Invited)

(18:50) The Challenge of Deformable Mirror for Spherical Aberration Compensation

S. Aoki, M. Yamada, T. Yamagami (Sony, Japan)

We have successfully developed a high accuracy and easily controllable deformable mirror which is actuated by single actuator. Furthermore, we have obtained a reflective film of low stress which had previously been a challenge.

Mo-E-03

(19:15) Proposal of a Novel Surface Plasmon Head Structure for 1 Tbit/inch² Recording K. Hongo, T. Watanabe (Sony, Japan)

We propose a double nano-rods surface plasmon head to reduce optical spot size inside a recording media. The FDTD simulation showed the spot size of 22×36 nm², which indicated the capability of the head.

Mo-E-04

(19:35) Integrated Micro Solid Immersion Lens for Near Field Optical Data Storage

M. Brun, M. Richard, S. Nicoletti (CEA-LETI, France)

Micrometer sized solid immersion lenses have been fabricated on 200 mm wafer using IC technologies. Morphological characterisations and optical performances will be discussed and compare to finite element simulations.

October 6, 2009 (Tuesday)

Drive Technologies, Testing Methods and Systems

Presiders : N. -C. Park (Yonsei Univ., Korea)

- K. Tanaka (Teikyo-Heisei Univ., Japan)
 - I. -H. Choi (LG, Korea)

S. Higashino (Sony, Japan)

Tu-F-01 (Invited)

(9:00) High-Speed Flexible Optical Disk for Broadcast Archival Storage

D. Koide*, T. Kajiyama*, Y. Takano*, H. Tokumaru*, N. Onagi**, Y. Aman**, K. Ohishi*** (*NHK, Japan, **Ricoh, Japan, ***Nagaoka Univ. of Technology, Japan)

Flexible optical disks can rotate at more than 15000 rpm and are capable of high-data-rate recording. We achieved low byte-error-rate for 252-Mbps recording and demonstrated recording and playback of HDTV video for broadcast use.

Tu-F-02

(9:25) Adaptive Neural Network Hybrid Equalizer for High Density Optical disc

M. Itonaga, K. Matsuzaki, A. Saito, A. Hayami (JVC, Japan)

A new type of hybrid equalizer was developed. A linear equalizer and an adaptive self learning type neural network equalizer are combined into one equalizer. Basic performances are successfully confirmed with 35GB Blu-ray R discs.

Tu-F-03

(9:45) Distance Enhancing Trellis Coded Partial Response Maximum Likelihood for Optical Recording Channels

S. Higashino, S. Kobayashi, T. Yamagami (Sony, Japan)

We developed a new MSN code sustaining RLL constraint and the TCPRML detector. The minimum Euclidean distance of the detector was enhanced compared to the conventional PRML. It is useful for low SNR and inter-layer-crosstalk.

Tu-F-04

(10:05) Improvement of Shock Resistance for SIL based NFR System using Air Bearing Surface

Y. Lee^{*}, Y. -E. Lee^{**}, K. -H. Kim^{*}, S. Kim^{*}, S. J. Lee^{*}, N. -C. Park^{*}, Y. -P. Park^{*}, K. -S. Park^{*} (*Yonsei Univ., Korea, **Korea Aerospace Industries, Korea)

This paper verified the effect of the ABS to improve the shock resistance in the SIL based NFR system through the gap servo control system, the FE model considering the polycarbonate disc mode and experiments.

Tu-F-05

(10:25) Coding and Signal Characteristics of Signal Waveform Modulation Multilevel Read-only Disc H. Liu***, J. Pei*, Y. Ni*, L. Pan* (*Tsinghua Univ., China, **Yanshan Univ., China)

This paper presents modulation code method and signal characteristics of signal waveform modulation multilevel optical disc. The modulation code consists of run-length-limited modulation and level modulation. RF signal characteristics are also described in this paper.

Break (10:45 - 11:05)

Tu-F-06

(11:05) Towards a Flat Rotating Flexible Disk for High Speed Optical Data Storage

A. M. M. Gad, Y. C. Rhim (Yonsei Univ., Korea)

This study introduces an axisymmetrically curved stabilizer to attain the goal of flat rotating flexible disk for high-speed optical data storage. The experiments show that the disk becomes almost flat with much smaller axial runout.

Tu-F-07

(11:25) A Low-Complexity Soft-Input Soft-Output Channel Detector for Coded Single-Head Multi-Track Systems

Z. Qin, S. M. Foo, K. Cai, S. Zhang (Data Storage Institute, Singapore)

In this paper, we propose a low-complexity softinput soft-output channel detector with near-optimal bit-error-rate performance for iterative receivers over low-density parity-check (LDPC) coded single-head multitrack channels.

Tu-F-08

(11:45) New Signal Quality Evaluation Method for 33.4GB/Layer BDs

J. Shiraishi*, S. Kobayashi*, H. Miyashita**, Y. Hino** (*Sony, Japan, **Panasonic, Japan)

We developed a new signal evaluation method i-MLSE for higher linear-density BDs(33.4GB/L). With this method, technical issues of the former method has been solved and better performance can be obtained.

Tu-F-09

(12:05) Application of Multiple Wavelength Recording to Random Pattern Reference Scheme

A. Inoue*, Y. Takayama**, K. Kodate* (*Japan Women's Univ., Japan, **NICT, Japan)

We propose multiple wavelengths holographic recording with the random pattern reference scheme. We report here on both the theoretical background and results of our experiments regarding the feasibility of this system.

Poster Session I (13:55 - 15:25)

Presiders : M. Takeda (Kyoto Inst. of Tech., Japan) Y. Kawata (Shizuoka Univ., Japan) H. Tokumaru (NHK, Japan)

Tu-G-01

4x Speed Dual-Layer Blu-ray Disc Using Organic-Dye

K. Tajima, H. Sasaki, M. Masumoto, M. Mizuno (Mitsubishi Kagaku Media, Japan)

We demonstrated the dual-layer BD-R (50GB) with organic-dye at speeds of up to 4x. L0 and L1 jitter value of less than 7 % and 8.5 % were obtained at speed from 2x to 4x.

Tu-G-02

Non-Volatile Property of Erasable Polarization Holographic Gratings in Dye-Doped Liquid Crystals

W. -C. Su, J. -Y. Jiang, M. -C. Chang, K. -J. Wu, K. -F. Liu (National Changhua Univ. of Education, Taiwan)

Non-volatile reading of a rewritable polarization hologram in azo-dyo-doped liquid crystal films can be performed by using a s-polarized beam, and it can be easily erased with illumination of a p-polarized wave.

Tu-G-03

High Resolution Interference Microscopy: 3D Measurement of Focused Light at 405nm applied to Optical Disc

M. Kim, T. Scharf, H. P. Herzig (EPFL, Switzerland)

We present a High Resolution Interference Microscopy working at 405 nm. We applied this to phase measurements and focal point studies for optical discs and show measured 3D intensity distribution for different conditions.

Tu-G-04

The Structure Analysis on Phase Change Material Using Synchrotron Light

S. -W. Chen*, D. Chiang**, C. -T. Yang***, J. -M. Chen* (*National Synchrotron Radiation Research Center, Taiwan, **National Applied Research Laboratories, Taiwan,***Industrial Technology Research Institute, Taiwan)

We used the synchrotron light to study the atomic spatial arrangement of AgInSbTe phase change material during the phase transformation process. Indium atom plays an important role during transformation.

Towards a True Archival-Quality Optical Disc

B. M. Lunt, M. R. Linford (Brigham Young Univ., USA)

Research has shown that today's optical discs are presently not a reliable option for archival storage. This paper discusses solutions necessary to solve this problem and produce a true archival-quality disc.

Tu-G-06

Super-Resolution Near-Field Disk with Phase-Change Bi-doped GST Mask Layer

M. L. Lee*, Jayang**, C. L. Gan**, L. H. Ting*, L. P. Shi* (*Data Storage Institute, Singapore, **Nanyang Technological Univ., Singapore)

A mask layer of $Bi_1Ge_1Sb_1Te_4$ was developed and used on Super-resolution near-field phase change optical disks. Thermal and optical properties of the mask layer were investigated. The recording performance of the new structure is discussed.

Tu-G-07

Phase-change masking for Nanolithography

We propose a novel high throughput and low cost nanolithography method based on the phase-change masking thin films. The selective wet-etching characteristics of laser patterned Ge₂Sb₂Te₅ thin film layer by alkaline solution NaOH are discussed.

Tu-G-08

High-Resolution Mastering Using Metallic Glass Inorganic Resist

M. L. Lee*, S. K. B. Ghani**, K. W. Tan**, C. L. Gan**, G. Q. Yuan*, L. T. Ng*, C. Y. Chong*, L. H. Ting*, L. P. Shi* (*Data Storage Institute, Singapore, **Nanyang Technological Univ., Singapore)

Mg-based metallic glass thin film was used as the thermal absorption layer of resist structure. Thermal, optical and etching properties of the absorption layer were investigated. The patterning profile of the new structure is discussed.

Reducing Axial Runout in a Flexible Optical Disk by Restricting Airflow to the Aerodynamic Stabilizer

T. Kajiyama*, D. Koide*, Y. Takano*, H. Tokumaru**, N. Onagi***, Y. Aman*** (*NHK, Japan, **NHK Engineering Service, Japan, ***Ricoh, Japan)

We have investigated aerodynamic stabilizer mechanisms for flexible optical disks. Axial runout can be effectively suppressed by restricting the airflow into the stabilizer, allowing a larger clearance to be set between the disk and stabilizer.

Tu-G-10

Error Prediction Robust Tracking Control System Suppressing Harmonic Disturbance for Optical Disk Recording System

Y. Kamigaki^{*}, K. Ohishi^{*}, T. Miyazaki^{**}, D. Koide^{***}, H. Tokumaru^{***} (*Nagaoka Univ. of Technology, Japan, **Nagaoka National College of Technology, Japan, ***NHK, Japan)

The tracking control of optical disk system is required high precision and robustness in more high rotation speed. This paper propose the new tracking control system considering the harmonics disturbance suppression.

Tu-G-11

Passive-damping of the Axial Run-out for High Speed Rotating Flexible Disk Using the Idea of Damping Orifice

A. M. M. Gad, Y. C. Rhim (Yonsei Univ., South Korea)

This work introduces a new stabilizer design to reduce the axial run-out of high-speed rotating flexible disk using the idea of damping-orifice. The experiments show a reasonable damping effect is obtained with the introduced stabilizer.

Tu-G-12

New Write Strategy Optimization Technology for Blu-ray Disc

N. Takeshita, Y. Kanatake, T. Kishigami, K. Ikuta, Y. Kiyose (Mitsubishi Electric, Japan)

New Write Strategy Optimization Technology for Blu-ray Disc is discussed. Effectiveness of the proposed method to optimize the Write Strategy is experimentally confirmed.

Adaptive Nonlinear Partial Response Maximum Likelihood Detector Based on Reduced Multivariate Polynomial for Optical Recording Channel

G. Kong, J. Park, S. Choi (Yonsei Univ., Korea)

The nonlinear PR equalizer in the proposed detector enhances the performance of the conventional PRML detectors without much additional complexity, and also shows the astounding performance as the ratio of the jitter noise increases.

Tu-G-14

Performance Evaluation of the Reed Solomon and LDPC Codes for Blu-ray Disk Channels

G. Kong, S. Choi (Yonsei Univ., Korea)

Reed-Solomon and LDPC codes are the most popular error-correction codes in communication and recording systems. we apply the various coding schemes and compare the bit error rate performance in the optical recording channels.

Tu-G-15

Improved Evaluation Method of Optical Disks Life Expectancy for an Archival Digital Image

M. Irie*, Y. Okino**, T. Kubo*** (*Osaka Sangyo Univ., Japan, **Kansai Univ., Japan, ***T. Kubo Eng. Sci. Office, Japan)

We present and discuss an improved estimation method for the life expectancy of optical disks using an archival digital image in order to apply a rigorous clarification of archival grade disks.

Tu-G-16

Neuro-Interpolator for Holographic Data Storage

H. Osawa, M. Yamashita, Y. Okamoto, Y. Nakamura (Ehime Univ., Japan)

We propose the neuro-interpolator integrating the interpolator into neural network equalizer in holographic data storage. A simplification of neurointerpolator is performed by using a hybrid genetic algorithm, and the bit error rate performance is studied.

Tu-G-17

Quantitative Evaluation of Affect of Shrinkage Rate on Cross-Talk Noise in Reflection-Type Holographic Memory

M. Shigaki, Y. Yonetani, K. Nitta, O. Matoba (Kobe Univ., Japan)

We evaluate numerically acceptable shrinkage rate of photopolymer in a reflection-type holographic memory with angular multiplexing. Numerical results indicated that shrinkage rate of 0.11% is acceptable with no bit error by using 2:4 spatial coding.

Directional Control of Shift Selectivity of Speckle-multiplexed Holograms for Improving Repositioning Tolerance

M. Bunsen*, S. Fukuchi*, S. Takahashi*, H. Furuta*, A. Okamoto** (*Fukuoka Univ., Japan, **Hokkaido Univ., Japan)

A method for directional control of the shift selectivities of the speckle-multiplexed holograms with the anisotropic diffuser is proposed and experimentally investigated. Improvement of the repositioning tolerance of the recorded holograms is also confirmed.

Tu-G-19

Simulation and Experimental Analysis of Photopolymer Media in Holographic Memory

A. Goto*, S. Yoshida*, N. Yoshida*, M. Yamamoto*, T. Mizuta**, H. Miyake**, K. Fukaya***, K. Koseki*** (*Tokyo Univ. of Science, Japan, **Daicel Chemical Industries, Japan, ***Chiba Univ., Japan)

Photopolymers are a promising recording material for holographic memories. It's necessary to clarify the design conditions of recording/reproduction characteristics. We developed simulator and used it to clarify the relationship between media parameters and recording characteristics.

Tu-G-20

Assessment of Cross-Talk Noise in Confocal Scheme in Reflection-Type Holographic Memory with Speckle Shift Multiplexing

Y. Yonetani, K. Nitta, O. Matoba (Kobe Univ., Japan)

A confocal scheme is introduced to improve a signal to noise ratio in a reflection-type holographic memory with three-dimensional speckle shift multiplexing. Numerical results indicate that the signal to noise ratio improved along depth direction.

Tu-G-21

Optical Antennas and Their Potential Applications to 10 Terabit/in² Recording

H. Wang, C. T. Chong, L. Shi (Data Storage Institute, Singapore)

We studied optical antennas and proposed to use boundary resonance bowtie aperture type surface plasmon antenna to generate high efficiency sub 10 nm light source for ten terabit/in² data storage.

Tu-G-22

Tone-Controllable Codes for Holographic Data Storage System

D. Park, J. Lee (Soongsil Univ., Korea)

In this paper, we simulate the BER performance of the TC codes, and the ratios of ones and zeros in a page are 25:75, 40:60, and 60:40, respectively.

Limit of Angular Compensation Method for Recording Material Shrinkage Effect in an Off-Axis Holographic Storage System

C. -M. Lin (National Taitung Univ., Taiwan)

For an off-axis holographic storage system we obtained the characteristics of compensable limit of material thickness shrinkage as defined in this paper which can easily identify the feasibility of compensation under different recording conditions.

Tu-G-24

A Canonical Piecewise-Linear Model-Based Nonlinear Equalizer for Super-RENS Discs

H. Shim, M. Seo, S. Im, C. Kim (Soongsil Univ., Korea)

This paper presents the application of a canonical PWL model to developing a nonlinear equalizer for super-RENS systems. The experiments reveal that the proposed equalizer provide prominent improvement compared to the case without any equalizer.

Tu-G-25

A Second-Order Volterra Model-Based Equalizer for Super-Resolution Near Field Structure Discs M. Seo, S. Im (Soongsil Univ., Korea)

In this paper, we developed the second-order Volterra model-based equalizer for the super-RENS signal to

model-based equalizer for the super-RENS signal to mitigate the nonlinear ISI. The experiment results verified that the proposed scheme could efficiently improve the performance of super-RENS systems.

Break (15:25 - 15:55)

Poster Session II (15:55 - 17:25)

Presiders : M. Toishi (Sony, Japan) S. Higashino (Sony, Japan) T. Iida (Pioneer, Japan)

Tu-G-26

Page-Oriented Simulation for Shift-Multiplexed Holographic Data Storage System by Fast-Fourier Transform Beam-Propagation Method

J. Tanaka*, A. Okamoto*, M. Bunsen** (*Hokkaido Univ., Japan, **Fukuoka Univ., Japan)

We demonstrated recording/reading process with the color bitmap image in shift-multiplexed holographic data storage by fast-Fourier transform beampropagation method. This simulation gives greater flexibility on designing the optimum system and evaluating the bit error characteristics.

Efficient Carrier Separation from Photochromic Memory

T. Tsujioka, M. Yamamoto, K. Shoji, K. Tani (Osaka Kyoiku Univ., Japan)

The high carrier separation efficiency was achieved by developing the p-n hetero-structure and photochromic diarylethene with an electron-affinity. The carrier separation method would enable to control of recording sensitivity and nondestructive readout for photochromic memory.

Tu-G-28

Spatial Solitonlike States in BSO Crystal under Square-Wave Electric Field at Different Electrooptical Configurations

D. A. Konkin, R. V. Litvinov, Z. E. Kappassov (TUSUR, Russia)

The numerical simulation of the propagation of the one-dimensional light beam in the cubic gyrotropic photorefractive crystal with applied square-wave electric field is carried out for the different electrooptic configurations.

Tu-G-29

Existence Conditions of 1D Spatial Optical Solitons in Gyrotropic Photorefractive Crystal Bi₁₂SiO₂₀ under DC Field

R. V. Litvinov, Z. E. Kappassov, D. A. Konkin (TUSUR, Russia)

The solitonic beam can be formed only at the special orientations of the dc field and propagation direction of soliton relative to the crystallographic axes if the applied field value exceeds the some threshold

Tu-G-30

Diffractive Optical Element for the Integrated Collinear Holographic Storage System

H. -F. Shih, Y. -L. Tsai, Z. -B. Gao (National ChungHsing Univ., Taiwan)

The diffractive optical element (DOE), which has the functions of diffracting the reconstructed beam and generating the focusing error signal, was fabricated and tested for realizing the integrated collinear holographic storage system.

Tu-G-31

Small Size Opto-mechanical System for Turntable Thermal Mode Mastering Application

C. -T. Yang, C. -C. Huang, S. -C. Chen, C. -Y. Chen, C. -T. Cheng, Y. -C. Lee, S. -L. Chang (Industrial Technology Research Institute, Taiwan)

This paper is to investigate the small size blue laser opto-mechanical module system as a relatively low cost laser direct-write system for high speed thermal mastering, and examine the suitability of submicro/ nano structure fabrication.

Phase-Differential Modulation for Phase-Based Holographic Data Storage with Photorefractive Time-Domain Differential Phase Detection Method

M. Takabayashi, A. Okamoto, J. Tanaka (Hokkaido Univ., Japan)

We proposed and simulated a new signal modulation method for phase-based holographic data storage. By using phase-differential modulation, we can reduce detection errors in photorefractive time-domain differential phase detection method we have proposed.

Tu-G-33

Reproducing Evaluations of Optical Threshold Secret Sharing Technique based on Two-Wave Encryption

Y. Okada, A. Okamoto, M. Takebayashi (Hokkaido Univ., Japan)

We propose optical threshold secret sharing technique based on two-wave encryption for improving information security. We experimentally demonstrated the reproducing characteristics of the secret data with shares produced by dividing the correct key.

Tu-G-34

Margin Analysis for the Optical Correlation System using Holographic Discs

E. Watanabe, A. Naito, K. Kodate (Japan Women's Univ., Japan)

In this study, it has been confirmed that the margin of optical correlation is much wider than that of data storage in tracking and focusing.

Tu-G-35

Kalman Filter based Safety Mode for Stability of Near-Field Recording System using SIL

H. Hwang*, J. -G. Kim*, W. -H. Shin*, K. -S. Park*, N. -C. Park*, H. Yang*, Y. -P. Park*, J. M. Park**, D. H. Son**, J. K. Seo**, I. H. Choi** (*Yonsei Univ., Korea, **LG Electronics, Korea)

We propose a Kalman filter based safety mode. By using Kalman filter, an affection of noise can be minimized. Through experiments, the Kalman filter based safety mode is more powerful than the existing safety modes.

Tu-G-36

Required Number of Pulses for Generation of Multi Self-Pumped Phase-Conjugated (SPPC) Waves

M. Yamashita (Tokyo Univ. of Science, Japan)

At the beam power 0.3 mW, one SPPC image is obtained until about 12.5 pulses reduced. Two images at the beam power 1.2 mW are simultaneously observed until about 25 pulses reduced.

Fuzzy Control System Using Subtractive Clustering Algorithm in Solid Immersion Lens-Based Near-Field Recording System

J. H. Kim, H. Yang, J. B. Park, N. -C. Park (Yonsei Univ., Korea)

We propose fuzzy control system using subtractive clustering algorithm in solid immersion lens-based near-field recording system. fuzzy control system uses fuzzy rules to control gap servo in near-field recording system

Tu-G-38

The Influence of Wavefront Aberration on Signal Quality of Holographic Memory

Y. Ohuchi, S. Yoshida, T. Ohori, M. Yamamoto (Tokyo Univ. of Science, Japan)

we report the results of simulations where wavefront aberrations were generated in the reference beam during reproduction that were different than during recording, and the influence that these aberrations had on signal quality.

Tu-G-39

A Method for Recovering Deteriorated Data-pages in Selective Rewriting of Multiplexed Holograms Y. Matsumoto, M. Bunsen, Y. Muto, H. Furuta

Y. Matsumoto, M. Bunsen, Y. Muto, H. Furuta (Fukuoka Univ., Japan)

We propose a new optical recovering method of attenuated holograms for the selective data-page rewriting. We experimentally and theoretically prove that the deteriorated brightnesses and SNRs of datapages can be improved with our method.

Tu-G-40

Improved Anti-Shock Air Gap Control Algorithm with Acceleration Feedforward Control for High NA Near-Field Storage System using SIL

J. -G. Kim*, W. -H. Shin*, H. -W. Hwang*, K. -S. Park*, N. -C. Park*, H. -S. Yang*, Y. -P. Park*, J. M. Park**, D. H. Son**, J. K. Seo**, I. H. Choi** (*Yonsei Univ., Korea, **LG Electronics, Korea)

This paper describes improved anti-shock air gap controller for near field storage system using an acceleration feedforward controller. By applying the proposed gap servo system, control performance of external shock rejection is increased effectively.

Modified Two Dimensional Soft Output Viterbi Algorithm for Holographic Data Storage

J. Kim, J. Lee (Soongsil Univ., Korea)

When the readback signal has severe 2D ISI, the PR equalization is used to eliminate the 2D ISI. We introduce modified 2D SOVA for holographic data storage.

Tu-G-42

Dual-Wavelength Sensitized Photopolymer for Holographic Data Storage

S. Tao*, Y. Zhao**, Y. Wan*, P. Liu*, Q. Zhai*, D. Wang*, F. Wu** (*Beijing Univ. of Technology, China, **Technical Institute of Physics and Chemistry of CAS, China)

Novel photopolymers sensitized in blue-green wavelength band for holographic storage were investigated and evaluated. High diffraction efficiency together with high sensitivity and low shrinkage can be obtained by optimized combination with newly synthesized dyes.

Tu-G-43

Four Pixels Method using Small Size Spot in Holographic Data Storage System

J. H. Kim, H. Yang, J. B. Park (Yonsei Univ., Korea)

In this paper, we propose four pixels method using small size spot in holographic data storage system. Therefore, we obtain good performance to recording and retrieving in holographic data storage system.

Tu-G-44

Error correcting 4/6 Modulation Codes for Holographic Data Storage

J. Kim, J. Lee (Soongsil Univ., Korea)

We propose a 4/6 modulation code that can have coding gain using trellis modulation scheme.

Tu-G-45

Hybrid Compensation Methods for Recording Material Shrinkage Effect in the Collinear Holographic Storage System

C. -M. Lin (National Taitung Univ., Taiwan)

It was found that three hybrid methods could compensate the material shrinkage problem in the collinear holographic storage system based on the Born approximation method.

Nonlinear Modeling of Super-Resolution Near Field Structure Using a Canonical Piecewise-Linear Model

M. Seo, H. Shim, S. Im (Soongsil Univ., Korea)

This paper presents the results of applying the canonical piecewise-linear model to the nonlinear modeling of the super-RENS system. The experiment results verified that the canonical PWL model could efficiently model the super-RENS nonlinear channels.

Tu-G-47

Holographic Data Storage Channel Modeling with Inter-Page Interference

D. Park, J. Lee (Soongsil Univ., Korea)

In this paper, we model the HDS channel with IPI by using several delay filters and their coefficients. We simulate the performance of partial-response maximum likelihood (PRML) on the HDS channel with IPI.

Tu-G-48

Evaluation of Storage Density of Threedimensional Absorbers in Thin Scattering Volume Object as Photonic Data Storage Medium

K. Fujimoto, K. Nitta, O. Matoba (Kobe Univ., Japan)

Storage density of three-dimensional absorbers in a highly scattering object as thin photonic data storage medium is evaluated. Minimum distance between absorbers is derived numerically from the evaluation of contrast in the reconstructed absorption profile.

Tu-G-49

Numerical Evaluation of Controlled Scattering Property for Thin Photonic Data Storage Medium T. Manabe*, K. Nitta*, O. Matoba*, W. Watanabe** (*Kobe Univ., Japan, **AIST, Japan)

We evaluate a fabrication method of a threedimensional scattering object by many voids created by focused femtosecond laser pulses. Numerical results showed that the scattering coefficient can be controlled by void density.

Tu-G-50

Recording Petabyte Disc

E. Pavel (Storex Technologies, USA)

We report novel results for recording an optical disc with high density ~1PB. Multilayer nanomarks were experimentally obtained by using fluorescent photosensitive glass-ceramics and an optical head with λ =650 nm and NA=0.60.

October 7, 2009 (Wednesday)

Special Session: Application Roadmap

Presiders : T. Maeda (JST, Japan) Y. Murakami (Sharp, Japan) S. Tanaka (Pioneer, Japan)

We-H-01

(8:30) Application to Optical Data Storage

*T. Maeda (JST, Japan), Y. Tsuchiya (Sanyo, Japan), H. Tokumaru (NHK, Japan), H. Kobori (Toshiba, Japan)

After making the technical roadmap in 2006, we have made the application roadmap to respond to the strong demand for half and two years. We present the background, the progress, and the way to make it.

We-H-02

(8:50) Data Archive Roadmap of Optical Storage

S. Tanaka (Pioneer, Japan), H. Hatano (Konica Minolta Opto, Japan), M. Katsuki (Hitachi, Japan), T. Iwanaga (NEC, Japan), K. Tezuka (FUJITSU TEN, Japan), H. Tokumaru (NHK, Japan), T. Maeda (JST, Japan)

A data archive is one of the most important applications for optical storage. We present the future of data archive markets, trends, how to compete against other storages and new technical requirements for optical storage.

We-H-03

(9:10) Emerging Application to Optical Data Storage

*T. Maeda (JST, Japan), H. Kobori (Toshiba, Japan), Y. Tsuchiya (Sanyo, Japan), M. Toishi (Sony, Japan), T. Sato (KRI, Japan)

To drive the deployment of our industrial field, we have searched the emerging application which we are able to make the effective use of our accumulated technologies. We report the result.

We-H-04

(9:30) AV Application Roadmap of Optical Storage

Y. Murakami (Sharp, Japan), K. Yamashita (Hitachi, Japan), H. Tokumaru (NHK, Japan), H. Dobashi (NTT, Japan), T. Maeda (JST, Japan)

Higher performance optical discs are required continually to support the real constructing HD (2k1k) quality world and the upcoming higher quality (4k2k) world including such as 3D and digital cinema applications. We present how the future optical discs should meet the market demands with striking a good balance between data storage and broadband network.

Special Session

Presiders : M. Irie (Osaka Sangyo Univ., Japan) T. Iida (Pioneer, Japan)

We-H-06 (Invited)

(10:30) Optical Data Storage for Archive Application

T. Iwanaga, M. Kubota, M. Akiyama, S. Ohkubo (NEC, Japan)

We have newly developed an Archive Optical Storage (AOS) using thin film discs for a business archival region. AOS concept and technologies are described. And the importance and requirements for digital archive application are discussed.

We-H-07 (Invited)

(10:55) Optical Disc based Archive for Sustainable Society S. Murakami (Panasonic, Japan)

Today's and legacy storage solutions are primary designed for structured data, not for Fixed Content for long term Archiving. This paper propose Optical Disc based Archive solution which has legitimacy for the Fixed Content Storage in the comming low carbon society.

We-H-08 (Invited)

(11:20) Next Generation Interactive Audio-Visual Application and Systems for Realistic Communication and Experience

H. Kimata (NTT, Japan)

Next generation interactive audio-visual application and systems for realistic communication and experience are presented. They are designed to achieve immersiveness by real high-resolution panoramic videos, or to achieve face to face real live communication.

Anouncement of ISOM'10 (11:45)

Technical Tour (13:00 - 17:00)

October 8, 2009 (Thursday)

High Density Recording II

Presiders : M. Itonaga (JVC KENWOOD, Japan) T. Kikukawa (TDK, Japan)

- Th-I-01 (Invited)
- (8:30) Introduction of Volumetric Optical Storage Technology "Micro-reflector", an Ultra-Multilayer Optical Disk

S. Kobayashi, K. Saito, T. Iwamura, T. Horigome, H. Yamatsu, M. Oyamada, K. Hayashi, D. Ueda, N. Tanabe, H. Miyamoto (Sony, Japan)

We have successfully recorded more than 10-layers of signal into a simple structure optical disk. Using a Blu-ray similar optical pickup (405nm, 0.85NA), we have experimentally confirmed the playback signal.

Th-I-02 (Invited)

(8:55) The Progress of Multi-Layer Optical Disk Technology

A. Mitsumori, S. Tanaka, M. Ogasawra, Y. Tomita, T. Takishita, F. Yokogawa (Pioneer, Japan)

We have developed a multilayer ROM disk and tested its play-back stability with high definition moving pictures. Our results show the first step to realize the huge capacity archival storage.

Th-I-03

(9:20) Recording System for Multilayer Disk with a Separated Guide Layer

M. Nakano, K. Takahashi, M. Sato, M. Ogasawara, N. Kozasa, T. Takishita, S. Taniguchi (Pioneer, Japan)

We have developed a recording system for a multilayer recordable disk with a separated guide layer. This technology provides stability on recordings, compatibility with a conventional system and it enables easy and inexpensive disk manufacturing.

Th-I-04

(9:40) Plasmonic Three-Dimensional Optical Disk with Ten Recoding Layers

T. Tanaka****, T. Higuchi**, T. Koga**, A. Mitsumori** (*RIKEN, Japan, **Pioneer, Japan, ***JST, Japan)

A plasmonic fluorescent recording medium for multilayered disk is developed. Multi-layered disk with ten recording layers is fabricated, and storing and retrieving data without any significant crosstalk from the adjacent recording layers are demonstrated.

Th-I-05

(10:00) Fiber Confocal Microscope for Alignment-Free Readout System of Multilayered Optical Memory M. Tsuji, W. Inami, Y. Kawata (Shizuoka Univ., Japan) We developed alignment-free fiber confocal microscope for readout system of multilayered optical memory. We demonstrated that fiber confocal microscope had high axial resolution and could read bit data clearly.

Break (10:20 - 10:40)

High Density Recording III

Presiders : K. Curtis (InPhase, USA) T. Shimura (Univ. of Tokyo, Japan)

Th-J-01 (Invited)

(10:40) Commercial Holographic Data Storage

K. Curtis*, M. Ayres*, A. Hoskins*, S. Hughes*, T. Ishii**, K. Shimada** (*InPhase Technologies, USA, **Hitachi, Japan)

Key servo technology in InPhase's holographic storage drive is presented and tolerances and margin analysis for monocular implementation discussed.

Th-J-02

(11:05) Microholographic Recording Using Single-Sided Optics with Electrical Beam Control

R. Katayama, Y. Komatsu, M. Natsumeda (NEC, Japan)

A single-sided optics for microholographic recording along with an optical recording medium having a quarter-wave layer and a reflective layer has been proposed and experimentally demonstrated by using liquid crystal elements for electrical beam control.

Th-J-03

(11:25) Wide Playback Tolerance (x10) in a Coaxial Holographic Ddata Storage

A. Yamakawa, M. Saito (Sony, Japan)

We propose a new configuration of a coaxial holographic storage system. This configuration has realized the wide disc tilt tolerance of 0.3 degree, which is 10 times as wide as that of the conventional one.

Th-J-04

(11:45) Holographic ROM Fabricated by DRAW Process with Aromatic Photopolymer Recording Layer

T. Ando, K. Masaki, T. Shimizu (Nippon Steel Chemical, Japan)

DRAW process is proposed for holographic ROM fabrication technique to reduce ghost noise. The combination of DRAW process and aromatic photopolymer recording layer shows good read/write performances at large multiplexing numbers up to 1020.

Th-J-05

(13:35) Optical Compensation of Distorted Interference Fringes Depending on Temperature in Holographic Data Storage

T. Muroi, N. Kinoshita, N. Ishii, K. Kamijo, N. Shimidzu (NHK, Japan)

Shrinkage or expansion of photopolymer materials depending on temperature distorts interference fringes in a medium. Adaptive optics controlled by a genetic algorithm can compensate for the distortion and improve the quality of reproduced data.

Th-J-06

(13:55) Data Detection Methods for Holographic Data Storage Systems

O. Malki, Y. Chen, F. Przygodda, H. Trautner, H. Richter (Deutsche Thomson OHG, Germany)

We suggest a new method for data detection based on direct data identification. The proposed method requires a considerable computing time but it enables a lower symbol error rate.

Th-J-07

(14:15) Multilayer Page-Wise Holographic Storage

L. Xinan*, S. Solanki*, X. Xuewu*, R. B. A. Tanjun*, C. T. Chong*** (*Data Storage Institute, Singapore, **National Univ. of Singapore, Singapore)

Five layers of holograms were successfully recorded along the depth of media by using hybrid multiplexing method which combines random phase coded and polarization of reference beam. All the hologram recorded can be retrieved successfully.

Break (14:35 - 14:55)

Post Deadline Papers (14:55 - 15:55)

Presiders : J. Tominaga (AIST, Japan) R. Katayama (NEC, Japan)

The best 4 post deadline papers are orally presented.

Award & Closing (15:55 - 16:15)

Presiders : H. Tokumaru (NHK, Japan)

Program Committee, Chairperson

- S. Higashino (Sony, Japan)
- T. Iida (Pioneer, Japan)

Y. Kawata (Shizuoka Univ., Japan) Program Committee, Vice-Co-Chairs

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Conference Site (Nagasaki Brick Hall)



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