

ADVANCE PROGRAM



INTERNATIONAL SYMPOSIUM ON OPTICAL MEMORY 2003

NARA-KEN NEW PUBLIC HALL
(SHIN-KOKAIDO)
NARA, JAPAN
NOVEMBER 3-7, 2003

SPONSORED BY

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

Supported by

- Commemorative Organization for
the Japan World Exposition '70
- Support Center for Advanced
Telecommunications Technology
Research Foundation
- Nippon Sheet Glass Foundation for
Materials Science and Engineering

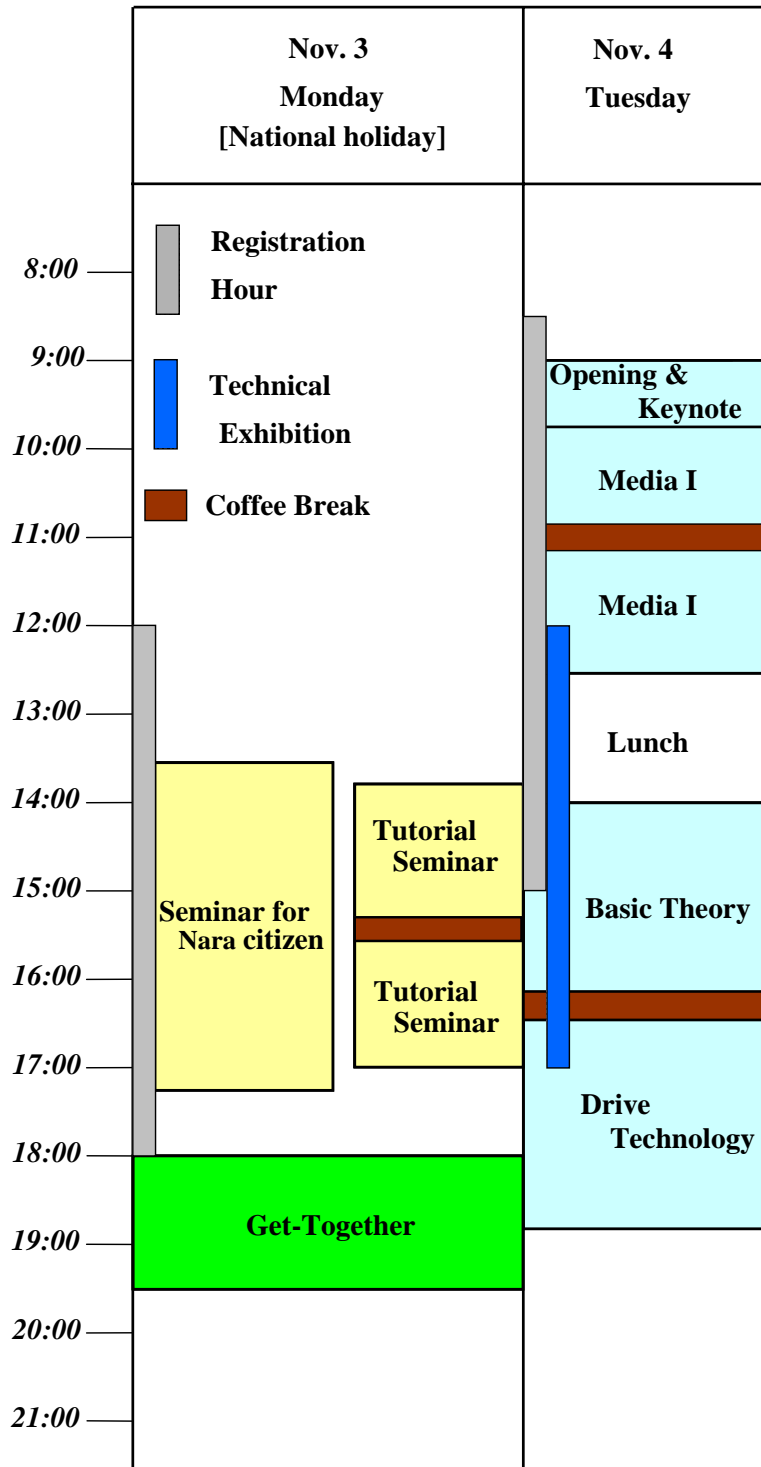
DEADLINES:

Post-deadline Papers: September 2, 2003

Pre-registration: September 30, 2003

<http://www.isom.jp/>

Symposium Schedule



Nov. 5 Wednesday	Nov. 6 Thursday	Nov. 7 Friday
High Density I	Components	High Density II
High Density I	Components	High Density II
Lunch	Lunch	Lunch
Poster Session I	Optical Storage System & Application, Testing & Devices	Post Deadline
Poster Session II		Award & Closing
	Media II	
Gagaku		Technical Tour
Banquet		

WELCOME TO ISOM2003

WELCOME STATEMENT FROM THE ORGANIZING COMMITTEE CHAIRPERSON



The 13th International Symposium on Optical Memory (ISOM2003) will be held in Nara, Japan November 3-7, 2003

Two years ago an economic bubble in IT business sector collapsed and during the first half of this year the world economy has been influenced a great deal by an epidemic of SARS. The world economy is still suffering from the bust of the bubble economy and an epidemic of SARS. Although the world economy has been in a bad situation for a few years, Internet and the related business have been developing constantly. The number of Internet users in the world has exceeded over 5 hundred millions in 2001 and by year-end 2005 the number will double to 1.12 billions. On a parallel with the increase of users, broadbandization of Internet is also continuing in the world. According to the development of Internet and the related business users are storing a lot of digital data personally. This leads to the increase of demand for the optical storages with the higher performance and the larger capacity. The number of the DVD players that were sold in the world in 2002 was estimated to reach more than a hundred million although that in 2000 was approximately 27 million. The number of the DVD recorders sold in the world in 2002 was 1.3 million and that in 2005 is estimated to get to 22.6 million. When the recovery of economic situation is achieved much more optical storages with higher performance and the larger capacity will be required for diversified purpose.

In order to respond the requirement development of new technologies for future optical storages is fundamental. In ISOM2003 the new technologies that will be essential for the future optical storages will be discussed.

ISOM2003 will be held on November 3-7, 2003 at the Nara-ken New Public Hall (Shin-Kokaido) in Nara, the oldest city in Japan.

Nara is very famous worldwide for cultural treasures, old temples and beautiful scenery. The Shin-Kokaido is originally a theater for Noh, Japanese lyrical drama. The presenters will get the privilege to be able to present on the stage of Noh.

Welcome to ISOM2003 in Nara and the ISOM Committees believe that all of you will enjoy the great event of ISOM2003, the oldest city in Japan and the cultural treasures in Japan.

A handwritten signature in black ink, reading "Tomoyuki Toshima". The signature is written in a cursive style with a long horizontal flourish extending to the right.

Tomoyuki Toshima
Organizing Committee Chairperson ISOM2003

INTRODUCTION

The 13th International Symposium on Optical Memory (ISOM) will be held from Nov. 3rd to 7th 2003 at Nara-ken New Public Hall (*Shin-Kokaido*) in Nara Prefecture, Japan. The purpose of the symposium is to provide a forum for information exchange on broad range of topics covering science and technology in optical memories. This year, 2003, high-end DVD systems using blue laser were shipped to the market. In addition, as discussed in ISOM/ODS2002, several novel approaches such as holographic, multi-level, three-dimensional, near-field and super-resolution technologies will be the main focuses on ISOM2003 for the next generation optical storage. The pure and applied theoretical studies in physics and mathematics will play a great role in further supporting and developing these new technologies. We welcome such novel proposals and basic concepts available to future storage technologies.

The symposium is held at Nara-ken New Public Hall (*Shin-Kokaido*) closely located at our world treasure, '*Todaiji temple*,' which was built in the 8th century and one of the oldest and biggest wood-made temples. In there, the biggest Buddhist has been enshrined. The city, Nara, had been the ancient capital of Japan by the 8th century.

SCOPE OF THE SYMPOSIUM

ISOM 2003 will discuss the current status of optical memory system design and applications, together with new developments in the areas of media, lasers, basic theory, system sub-components, and a range of future technologies. In addition to ordinary contributed papers, invited papers on important topics will be presented. Topics to be covered in this symposium include, but are not restricted to:

1. Basic Theory

- Diffraction, Polarization
- Analysis of Mark Formation
- Magneto-Optical Effects

- Near-Field Optics, FDTD Analysis

2. Media

- Rewritable, Write Once, Read-Only, Partial-ROM Media
- Characterization, Recording and Readout Mechanisms
- Manufacturing Technology
- Substrates, Mastering
- Land/Groove Recording
- Super-RENS
- Tribology

3. Drive Technology

- Drive Integration
- Drive Optics, Mechanics and Electronics Design
- Servo and Accessing Methods
- Read Write Channels, Error Correction
- Modulation Code
- Copy Protection

4. Components

- Optical Heads, Actuators, MEMS Fabrication
- Lasers, Lenses, Diffractive Optics, Detectors
- Short Wavelength Sources
- Integrated Optical Heads and Components

5. Testing Methods and Devices

- Testing & Evaluation Methods for Drives, Media and Components
- Drive Testers, Media Testers

6. Optical Storage Systems and Applications

- Rewritable, Write Once, Read-Only, Partial-ROM Systems
- AV-IT System Applications of Optical Recording
- Mobile Applications

7. High Density Recording

- Holography
- Scanning Probe and Near-Field Recording
- Multiwavelength Recording and Bistable Devices
- Photochromic and Photorefractive Materials
- Tera Byte and Sub Tera Byte Memories
- Volumetric Storage, Multi Level Recording
- Nano Memory and Materials
- Other Future Technologies

REGISTRATION

Advance Registration & Hotel Reservations

Kinki Nippon Tourist Co., Ltd. (KNT) has been appointed as secretariat for advance registration and hotel reservations for ISOM 2003. Those who wish to attend ISOM2003 should access to ISOM homepage: <http://www.isom.jp/>, where the procedure of the registration is described. You can select either ONLINE registration or Facsimile registration. The registration web site will be opened until **October 24** and the advantage of early registration rate is available by **September 30, 2003**.

If you have any questions, please contact:

ISOM 2003 Desk

Kinki Nippon Tourist, Co., Ltd., Event & Convention,
Kansai Office

c/o Kintetsu Shin-Namba Bldg. 8F, 1-4-38, Minatomachi,
Naniwa-ku, Osaka 556-0017 Japan

Phone : +81-6-6634-1180 Fax : +81-6-6634-1185

e-mail : eckansai@or.knt.co.jp

On-Site Registration

The Registration Desk will be located at the Entrance Hall of New Public Hall on Monday through Friday during the following hours. Because the Registration Desk in the morning on November 4 is supposed to be so crowded, it is recommended to finish your registration within November 3.

Nov. 3: 12:00 - 18:00

Nov. 4: 8:30 - 15:00

Nov. 5: 8:30 - 15:00

Nov. 6: 8:30 - 15:00

Nov. 7: 8:30 - 11:00

Registration Fees

Type	Until September 30	After September 30 , and on site
Regular	¥40,000	¥46,000
Student & Retiree	¥ 5,000	¥ 5,000
Banquet	¥ 6,000	¥ 6,000
Additional	¥ 5,000	¥ 5,000
Technical Digest		
Tutorial Seminar with a Text	¥ 5,000	¥ 5,000

The registration fee for the symposium includes admission to all the technical sessions, a copy of the technical digest for Regular but not includes the Technical Digest for Student & Retiree.

Payment

Payment should be made in Japanese yen by bank draft payable to ISOM 2003 Desk, bank transfer (inside Japan only) to the account shown below or credit card (Diners Club, AMEX, VISA, JCB and Master Card). No personal checks will be accepted. If unable to pay by these methods, please contact Kinki Nippon Tourist for alternative arrangements. On site payment should be made in Japanese yen only by cash.

*Bank transfer inside Japan

Bank Name : Mizuho Bank Ltd., Shirakaba Branch

Account Name : Kinki Nippon Tourist Co., Ltd.

Account Number : 1426119

*Please attach a copy of your bank transfer record when you register by fax.

Registration Cancellation

The cancellation fee amounted ¥5,000 will be deducted from the refund. Cancellation should be made by also accessing to the registration page in ISOM homepage or in writing to Kinki Nippon Tourist, but no cancellation will be admitted after **October 20, 2003**.

INSTRUCTION FOR SPEAKERS

<ORAL PRESENTATIONS>

The oral presentation stage is not allowed to step on with your shoes. Before presentations, oral speakers have to put off their shoes. The stage is strictly limited to be used for Japanese traditional arts, music and performances.

- (1) In order to run the program smoothly, speakers are requested to report to Session Registration Desk at least 30 minutes before their session starts. The Session Registration Desk will be located next to the Registration Desk.
- (2) Presiders are requested to be at the Session Registration Desk before the session starts. All speakers are requested to get in touch with the presider 15 minutes before their session starts.
- (3) Time assigned for:

		Presentation	Discussion
Keynote	(30 min.)	30 min.	
Invited	(25 min.)	20 min.	5 min.
Contributed	(20 min.)	15 min.	5 min.

- (4) Symposium room will be provided with an OHP and a projector including a computer within MO, CD-R/RW, PC-card and USB drives. Speakers may also bring their own computers. The projector has a VGA D-sub 15 pin input with an extension cable. Speakers, who will use their own note-PC, are requested to prepare an AC-DC converter and a mouse for their note-PC if necessary. AC 100V (60Hz) outlet will be prepared near the presentation table. Speakers who will use the projector are recommended to confirm the connection between their own note-PC and the projector during the break time or morning. In advance, speakers can check the connection between the same projector and their computers in an anteroom (addressed at the conference site). In order to use OHP, an assistant will be made available for each speaker by request. Please contact the session presider.
- (5) **In oral presentation, we recommend all authors to use more than 16-point font. The audience always expects better presentations with clear figures and captions, and good conclusions.**

<POSTER PRESENTATIONS>

- (1) Poster session will be held separately from 13:45 to 15:15, and from 15:45 to 17:15 on November 5 (Wed) in the Conference Rooms 1, 2 and 3. A display board with a size of 1.8-m wide by 1.2-m height will be available for each poster. Preparation should be done from 12:30-13:45 for the 1st poster session, and from 15:25-15:45 for the 2nd session. **Authors should set up and do not forget to remove their materials along the program time schedule.**
- (2) The session presiders check all speakers during the presentation time.
- (3) All speakers are requested to be at their posters during the session. In order to ensure a high-quality presentation, all poster materials must be in printed form.

POST-DEADLINE PAPERS

A limited number of papers will be accepted for presentation of significant results obtained after the deadline. Authors are requested to submit the papers through ISOM Web site (<http://www.isom.jp/>).

The 2-page summary preparation and 35-word abstract instruction, and submission procedures are obtained at the ISOM-web site (<http://www.isom.jp/>). In prior to the paper submission, a delegated author has to fill in the paper submission form including the 35-word abstract on the Web. Authors should be remind that their papers do not include local fonts. If you use Greek letters and specially designed letters in MSWord, go to the menu bar and insert the objective letters from 'Symbol font.' The pdf-styled 2-page summary is only accepted to the appointed e-mail address as an attached file along the instruction.

• **Submission Web Site is open from Aug. 20 to Sept. 2.**

Authors will be notified at latest by the end of September whether the paper is accepted or not.

The best 4 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.

PUBLICATION OF SYMPOSIUM PAPERS

JJAP Special Issue

In addition to the Technical Digest available at the symposium, symposium papers will be published on a special issue of the Japanese Journal of Applied Physics (JJAP) in July, 2004. The author must download author's kits of 'Application Form for Publication in JJAP', 'Summary Information for Contributors' and 'Notes for Contributors for Special Issues' from the web site at <http://www.isom.jp/jjap.html>. The deadline for submission of manuscripts is December 7, 2003.

The authors who will have, by themselves, presented papers at ISOM2003 are allowed and strongly recommended to submit their papers for publication on the Japanese Journal of Applied Physics (JJAP) special issue.

SPECIAL PROGRAM

(1) Tutorial Seminar

Tutorial Seminar is offered to expand your knowledge with technical information on current state of research and developments in optical memories.

The tutorial seminar contains two tutorials. Pre-registration using online registration or facsimile registration is advised due to limited class size. After filling the capacity, the pre-registration will be closed. Pre-registration procedure is described at ISOM homepage (<http://www.isom.jp/>).

Date & Time: Monday, November 3 13:45-17:00

Place: Conference Room 1&2
(Nara-ken New Public Hall 1st Floor)

Fee: Regular; ¥5,000 (with a text)
Student; free (no text)

(After dead-line of pre-registration, fee must be paid on site, cash only)

Language: English

T-1 13:45-15:15

Introduction to Multilayered Optical Memories for Terabyte Data Storage

Prof. Yoshimasa Kawata (Shizuoka Univ., Japan)

This course gives a comprehensive lecture on multilayered optical memories. Key technologies of two-photon recording, confocal readout, and recording materials are introduced. The history and recent developments of multilayered memories are reviewed.

15:15-15:30 Coffee Break

T-2 15:30-17:00

Blu-ray Disc Rewritable Technologies

Shunji Ohara (Matsushita, Japan)

BD technologies such as, dual layer disc, optical head, addressing, signal processing, cartridge, write strategy and other basic technologies will be discussed.

(2) Social Program

• Get-Together

Date & Time: Monday, November 3 18:00 - 19:30

Place: The garden and the restaurant “*Noh*”, both in the Nara-ken New Public Hall

All attendees including spouses are invited to the Get-Together Reception. If one is lucky, he/she can enjoy beautiful autumn evening in a Japanese garden.

• Banquet and Entertainment

Pre-Banquet Entertainment

Date & Time: Wednesday, November 5 17:45 – 18:15

Place: Noh Theatre, the Nara-ken New Public Hall

Cost: Free of charge

In the Pre-Banquet Entertainment, old Japanese music and dance handed down from the 8th century, called *Gagaku*, will be performed.

Banquet Reception

Date & Time: Wednesday, November 5 18:15 – 20:15

Place: Reception Hall (2nd Floor), the Nara-ken New Public Hall

Cost: ¥6,000

The ticket for the Banquet Reception is not included in the registration fee. Application can be made either online or by fax (The form is available on the ISOM2003 homepage).

(3) Technical Exhibition

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

Date & Time : November 4 12:00 - 17:00
 November 5 10:00 - 17:00
 November 6 10:00 - 17:00
Place : 2nd Floor Gallery, the Nara-ken New
 Public Hall

(4) Technical Tour

Date & Time: Friday, November 7 15:30-18:00
Place: SHARP Memorial & Technology Hall
Cost: free
Schedule: Shin-Kokaido(15:30)---bus---Sharp(16:00-17:00)
 ---bus---Kintetu Nara Station(18:00)

<Memorial Hall>

This hall was established in 1981 in honor of Sharp's founder, Tokuji Hayakawa.

Exhibited here are historic products, including Japan's first crystal radio, the world's first electronic calculator, etc.

<Technology Hall>

Sharp's latest technological developments such as solar cells and LCD technologies are introduced in an easy-to-understand manner.

(5) Seminar for Nara citizen

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

Date & Time: Monday, November 3 13:30-17:10
Place: Noh Theatre, the Nara-ken New Public Hall
Cost: free
Language: Japanese

こうなっていたのか光ディスク 沖野 芳弘 (関西大学)
(What is the Optical Disk?: Y.Okino (Kansai Univ.))
光ディスクのある暮らし -新しい生活創造は光ディスクから-
田中 伸一 (松下電器産業)
(Modern Life with Optical Discs: S.Tanaka (Matsushita))
光メモリのアーカイバル(人智・文化・世界遺産の保存)
久保 正敏 (国立民族学博物館)
(Archives by Optical Disk:
M.Kubo (National Museum of Ethnology))
ナラでナノを知る(ナノの世界を見る、作る) 河田 聡 (大阪大学)
(See and make Nano size structure: S.Kawata (Osaka Univ.))
奈良が誇る先端技術:ビジョンチップ 太田 淳 (奈良先端大学)
(Vision Chip: J.Ohta (NAIST))

(6) Excursion

・Shika yose (Deer Calling Performances)

In early morning (8:30-8:45) of November 5, Deer Calling will be performed in Nara Park by members of the local Society for Protection of Deer. Deer caller blows a horn to gather deer.

・Walking Tour Around The New Public Hall

Date: Tuesday, November 4, and Thursday, November 6

Course: Todaiji Temple ---> Nigatsudo Hall ---> Kasuga
Grand Shrine

Duration: 3 hours

Meeting time & place: At the lobby of the New Public Hall at
13:15

Fee: ¥500 (Admission fee to Todaiji Temple)

Volunteer will guide you in English. Reservation is unnecessary.

HOTEL ACCOMMODATIONS

A block of rooms has been reserved by Kinki Nippon Tourist 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!

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. You can select either ONLINE reservation or Facsimile reservation to reach ISOM 2003 Desk (See Registration) no later than Fri., Oct. 3, 2003 together with the payment of deposit (10,000 yen per room or, if you apply for 1-night single room, the single room rate of your preferred hotel) and handling charge (500 yen per room).

Hotel Name	Type	Code	Rate (yen)	Access
Mitsui Garden Hotel Nara	Single room	A-S	9,450	1 min. walk from JR Nara Station west gate.
	Twin (2 persons)	A-T	16,800	
	Twin (1 person)	A-U	12,600	
Nara Washington Hotel Plaza	Single room	B-S	8,295	4 min. walk from JR Nara or 6 min. walk from Kintetsu Nara Station.
	Twin (2 persons)	B-T	15,960	
	Twin (1 person)	B-U	11,550	
Hotel Fujita Nara	Single room	C-S	7,875	5 min. walk from either Kintetsu Nara or JR Nara Station.
	Twin (2 persons)	C-T	14,700	
	Twin (1 person)	C-U	12,600	

*The above rates are per room including service charge and 5% consumption tax. No meal included.

*The hotel deposit will be deducted from your payment of hotel charges.

*No reservation will be made without payment of deposit and handling charges.

Payment

Payment must be completed in Japanese Yen when you make reservations either by bank draft, bank transfer or credit card. (For details, see Registration.)

Hotel Cancellations

Any kind of cancellation or reservation change must be submitted in writing to ISOM 2003 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.

9 days or more prior to the date of arrival:	No charge
8 to 2 days prior:	20% of one night accommodation fee
Fewer than 2 days prior, or no notice given:	100% of one night accommodation fee

GENERAL INFORMATION

(1) Official Language

The official language of ISOM2003 is English.

(2) Message Board

Official Information Board and Message Board will be set near the Registration Desk. Message will be taken during registration hours on Monday through Friday 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 ISOM2003 Symposium Office. The telephone number, and fax number for the Symposium Office in the Conference Room 4 of the Nara-ken New Public Hall are 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 2003 Symposium Office. All the attendees are requested either to have lunches in the restaurant “*Noh*” in the Nara-ken New Public Hall, or to find restaurants near the Nara-ken New Public Hall. A map for finding restaurants near the Nara-ken New Public Hall will be available at the ISOM2003 Information Desk.

(5) Transportation

We recommend walking along the Nara Park. It takes 15 minutes to

the Nara-ken New Public Hall (Shin-Kokaido) from Kintetsu Nara Station, it takes 30 minutes from JR Nara Station.

From Nara Station, city bus numbers 2 or 6, or buses bound for Takabatake-cho may be taken to bus stop, "Daibutsu-den Kasugataisha Mae" (approximately a 7 to 10-minute ride). It is only a three-minute walk to the Nara-ken New Public Hall (Shin-Kokaido) from there. Buses run every five minutes.

The basic fare for a taxi is ¥590. The cost of a taxi from JR Nara Station, or Kintetsu Nara Station to the the Nara-ken New Public Hall (Shin-Kokaido) should be around ¥680~¥800.

(6) Parking

There are 50 parking sections at a basement in the Nara-ken New Public Hall. Guests may park there. Parking fee: ¥200 per one hour or ¥1,000 per one day.

(7) Others

The live telecast of Oral Session will be served in Reception Hall (2nd Floor). Attendees will have access to a free Internet service during the week of the Symposium at the Nara-ken New Public Hall.

To receive further information about ISOM2003, please access to the ISOM-web site (<http://www.isom.jp/>)

(8) Introduction of Nara

Nara, a beautiful ancient city of World Heritage, is cultural and historical important place in Japan, having been the capital of the country in 710-784 A.D. There are numerous temples, shrines, statues, carvings and paintings, many of which are well preserved and designated as important cultural assets and national treasures. Nara-ken New Public Hall is situated in Nara Park, where you can also find famous historical buildings such as Todai-ji Temple, Kofuku-ji Temple, and Kasuga Grand Shrine. Nara Park is also famous for its thousands of tame deer that roam freely.

Nara Prefecture <http://www.pref.nara.jp/index-e.html>

Nara City <http://www.city.nara.nara.jp/english/index.htm>

(9) SARS Information

Please access to the ISOM web-site (<http://www.isom.jp/>) and watch the current conference information. The ISOM committee will respond to the SARS problems in accordance with recommendations of WHO and Japanese government.

TECHNICAL PROGRAM

November 4, 2003 (Tuesday)

Opening and Keynote Session (9:00-9:40)

Presider : J. Tominaga (AIST, Japan)

Program Committee, Chairperson

Tu-A-01 (9:00)

Opening Remarks

T. Murakami (OITDA)

Steering Committee, Chairperson

Tu-A-02 (Keynote)

(9:10) Optical Cognitive Information Processing – A New Field

S. R. Ovshinsky (Energy Conversion Devices, USA)

I will discuss unique electronic and structural mechanisms of Ovonic optical phase-change devices making possible orders of magnitude increase of density of memory and introducing multiple information functions in a single nanostructure spot.

Media I (9:40-12:30)

Presiders : N. Yamada (Matsushita, Japan)

M. Mansipur (Univ. of Arizona, USA)

Tu-B-01 (Invited)

(9:40) Phase-Change Media beyond 8x DVD+RW

L. van Pieterse, J. C. Rijkers (Philips, Netherlands)

The feasibility of 12x DVD+RW media based on novel doped Ge-Sb compositions is discussed in terms of crystallization rate of the phase-change material and implications of stack design for back growth and write strategy.

Tu-B-02 (Invited)

(10:05) Phase Change Recording Media for System with NA of 0.65 and Light Incidence on 0.6mm-Thick Substrate

N. Ohmachi, K. Yusu, S. Ashida, T. Tsukamoto, T. Nakai, A. Ogawa, N. Morishita, N. Nakamura, K. Ichihara (Toshiba, Japan)

A rewritable phase change media of 20GB capacity has been developed for system with NA of 0.65 and light incidence on 0.6-mm-thick substrate. The important features to achieve high capacity will be discussed.

Tu-B-03

(10:30) Rewritable 2x-Speed Dual-Layer Blu-ray Disc

T. Nishihara, H. Kitaura, R. Kojima, N. Miyagawa, T. Akiyama, K. Nishiuchi, N. Yamada (Matsushita, Japan)

50GB-capacity and 72Mbit/s data-transfer-rate were achieved. Each layer has 6-films as likely for the reported 1x-speed type except recording layer. We adopted newly developed compound type films and obtained jitters 6.9% (L0) and 8.0% (L1).

Coffee Break (10:50-11:10)

Tu-B-04

(11:10) The BD-Type Multi-Layer 100 GB ROM Disk using the Photopolymer Sheet

N. Shida, T. Higuchi, Y. Hosoda, H. Miyoshi*, A. Nakano*, K. Tsuchiya* (Pioneer, Japan, *Hitachi Chemical, Japan)

We investigated the BD-type multi-layer 100 GB ROM disk using the photopolymer sheet. The jitter values of layer 0, layer 1, layer 2 and layer 3 were obtained 6.5%, 7.1%, 7.3% and 6.6%, respectively.

Tu-B-05

(11:30) Simulations of MO Recording Processes with Crescent Shaped Marks

A. Tsukamoto, K. Nakagawa, A. Itoh, T. Uchiyama*, N. Ohta** (Nihon Univ., Japan, *Fujitsu Labs., Japan, **Hitachi Maxell, Japan)

Newly developed simulations of MO recording process

were performed to treat arbitrary shaped marks. The results show that the rapid quenching of the film temperature plays an important role to write crescent-shape domains as high as 100Gb/in².

Tu-B-06

(11:50) Dual-Layer Phase Change Recording Media for System with NA of 0.65 and Light Incidence on 0.6mm-Thick Substrate

T. Nakai, T. Tsukamoto, S. Ashida, K. Yusu, K. Ichihara, N. Yoshida, N. Ohmachi, N. Morishita, N. Nakamura (Toshiba, Japan)

We have investigated the recording characteristics of the dual-layer AOD (Advanced Optical Disc) having the better mass productivity, with 36GB capacity. Bit error rate measurements have successfully demonstrated the feasibility of the dual-layer AOD.

Tu-B-07

(12:10) New Approach of Multi-Speed Initialization-Free Phase-Change Optical Disk

X. S. Miao, L. P. Shi, P. K. Tan, J. M. Li, K. G. Lim, T. C. Chong (DSI, Singapore)

The optimization of disk structure, new writing strategy and thermal balance design are proposed to further widen multi-speed recording range of initialization-free phase-change disk. The simulation and experiment results show a wider recording speed range.

Lunch (12:30-14:00)

Basic Theory (14:00-16:05)

Presiders : J. Tominaga (AIST, Japan)

J. H. Kim (Samsung, Korea)

Tu-C-01 (Invited)

(14:00) Nonuniform and Adaptive Mesh FDTD Simulation Tools for Optical Data Storage Applications

A. R. Zakharian, J. V. Moloney (Univ. of Arizona, USA)
Scalable and parallel multi-processor implementations of a 3D FDTD nonuniform and adaptive mesh refinement solver for Maxwell's equations are described. The scheme will be illustrated with applications to optical data storage.

Tu-C-02

(14:25) Polarization Dependence of Readout Signals

Transmitted from Super-RENS Disks

T. Nakano, E. Mashimo, T. Shima, J. Tominaga (AIST, Japan)

We investigated the polarization dependence of transmitted signal from super-RENS disks. In the super-resolution readout, light with a polarization parallel to the pit trains, indicated more signal enhancement than that perpendicular to the trains.

Tu-C-03

(14:45) Improvements in Throughput and Spatial Resolution using a Scatterer-Formed Aperture

K. Tanaka, M. Oumi*, T. Niwa*, T. Miyatani*, Y. Mitsuoka*, K. Nakajima*, T. Ohkubo**, H. Hosaka, K. Ito (Univ. of Tokyo, Japan, *Seiko Instruments, Japan **Toyo Univ., Japan)

We demonstrate with simulations and experiments that our proposed scatterer-formed structure realizes a significant and simultaneous improvement in throughput and spatial resolution.

Tu-C-04

(15:05) Influence of Hot Carrier Diffusion on the Density

Limitation of Optical Data Storage

M. Laurenzis, P. H. Bolivar, H. Kurz (Aachen Univ., Germany)

The phenomenon of hot carrier diffusion (HCD) in optical data storage is theoretically and experimentally investigated. In high density storage media HCD can lead to laterally broadened temperature distributions which fundamentally limit storage density.

Tu-C-05

(15:25) Bi in GeTe-(Sb,Bi)₂Te₃ Contributes to High-Speed Phase Change: An Elucidation of its Mechanism

T. Matsunaga, N. Yamada* (Matsushita Technoresearch, Japan, *Matsushita, Japan)

Replacing Sb with Bi in GeTe-Sb₂Te₃ pseudo-binary compound brings its crystal structure closer to the amorphous phase. This is the chief factor by which addition of Bi raises crystallization speed.

Tu-C-06

(15:45) Surface Plasmon Effects on the Far-field Signals of AgOx-type Super-RENS

W. C. Liu, M. Y. Wu, D. P. Tsai* (Nat'l Taiwan Normal Univ. Taiwan, *Nat'l Taiwan Univ., Taiwan)

Far-field signals of embedded silver nanoparticles and those of embedded nano-cavities were simulated with finite-difference time-domain method to explore the surface plasmon effects in the AgOx-type Super-RENS.

Coffee Break (16:05-16:25)

Drive Technology (16:25-18:50)

Presiders : R. Katayama (NEC, Japan)

H. Miyamoto (Hitachi, Japan)

Tu-D-01 (Invited)

(16:25) New PRML Method for High-Speed and High-Density Recording

H. Minemura, T. Kurokawa, H. Shirai*, R. Tamura* (Hitachi, Japan, *Hitachi Maxell, Japan)

We have developed a new PRML method for improving bit-error-rate in high density conditions. In this paper, we report experimental results of over 30 GB capacities and high-speed test results at 200 Mbps.

Tu-D-02

(16:50) Application of the Sliding Mode Controller to Optical Disk Drives

K. Takahashi, K. Tateishi, Y. Tomita, S. Ohsawa (Pioneer, Japan)

We present an enhanced servo system, "Sliding Mode Controller" applied to optical disk drives and experimentally confirm that it can realize a remarkable servo performance in the high density disk system such as "Blu-ray".

Tu-D-03

(17:10) A New Tracking Servo System using a Phase-Shift

Differential Push-Pull Method for Recordable Optical Disks

T. Ueyama, Y. Watanabe, T. Numata, K. Sakai, Y. Kurata (Sharp, Japan)

We improved a Phase-Shift Differential Push-Pull (PS-DPP) tracking method for recordable disks such as DVD±R/RW and BD. We optimized the multidivision phase-shift grating to compensate for PS-DPP offset between recorded and unrecorded tracks.

Tu-D-04

(17:30) High-Speed Tracking Method using ZPET-FF Control for High-Data-Rate Optical Disk Drives

D. Koide, H. Yanagisawa, H. Tokumaru, S. Nakamura, K. Ohishi*, K. Inomata*, T. Miyazaki** (NHK Japan, *Nagaoka Univ. of Technol., Japan, **Nagaoka National College of Technol., Japan)

We studied high-speed and precise characteristics of proposed ZPET-FF control system compared with conventional repetitive control system. And the experimental results of precise performance using ZPET-FF control at high-speed disk rotation are presented.

Tu-D-05

(17:50) A Low-Power Laser Driver for Portable Blue

B. M. de Boer, J. A. van den Homberg (Philips, Netherlands)

Power modelling shows that an average power of 50mW is feasible for a portable blue drive with an application data rate of 1Mb/s. A low-power laser driver was designed for such a drive.

Tu-D-06

(18:10) Advanced Technologies for Read Channel on BD

J. Tonami, H. Nakamura, T. Ohki, T. Tashiro, Y. Suganuma, E. Nakano, A. Hayami (JVC, Japan)

We developed new technologies for read channel corresponding to BD rewritable and -ROM as the future format. Practical subjects like system clock, random access and error rate margin have been achieved.

Tu-D-07

(18:30) Noise-Predictive Viterbi Detector with Pattern-Dependent Distortion Canceller for High Density Optical Recording

A. Itoh, T. Hiura, H. Ino, S. Kobayashi (Sony, Japan)

NPML detection with a Pattern-Dependent Distortion Canceller (PDDC) was applied to a Blu-ray Disc to cancel nonlinear distortion. NPML/PDDC detection provides a lower error rate, radial-tilt margin, tangential-tilt margin and spherical-aberration margin.

November 5, 2003 (Wednesday)

High Density Recording I (9:00-12:30)

Presiders : K. Itoh (Ricoh, Japan)

M. Takeda (Sony, Japan)

R. Tamura (Hitachi Maxell, Japan)

We-E-01 (Invited)

(9:00) Dual-Layer Inorganic Write-Once Disc Based on Blu-ray Disc Format

H. Inoue, H. Kakiuchi, K. Mishima, M. Aoshima, H. Utsunomiya (TDK, Japan)

We have developed dual-layer write-once disc with a Cu alloy and a Si recording stacks on the based of Blu-ray Disc format. We got sufficient jitter values and optimum recording power at high-speed recording.

We-E-02 (Invited)

(9:25) Ultra High Density Recording toward 100Gbit/in² by using a Magnetic Domain Expansion Readout Technique of ZF MAMMOS

H. Awano (Hitachi Maxell, Japan)

Enlarged MO signal of very tiny domains less than 80nm in length on track width of 170nm can be clearly reproduced by using a magnetic domain expansion readout technique named as MAMMOS toward 100Gb/in².

We-E-03

(9:50) Double-MAMMOS: 3-Dimensional Magnetic Amplifying MO System

K. Nakagawa, A. Itoh, T. Uchiyama*, N. Ohta**(Nihon Univ., Japan, *Fujitsu Labs., Japan, **Hitachi Maxell, Japan)

We have successfully demonstrated the write/read test of ultra high density MO recording as high as 100Gb/in² (50 Gb/in² x2) by employing a new method of 3-dimentional magnetic amplifying MO system named double-MAMMOS.

We-E-04

(10:10) Bit-Wise Volumetric Optical Memory Utilizing Two-Photon Absorption in Aluminum Oxide Medium

M. S. Akselrod, S. S. Orlov, G. M. Akselrod (Landauer, USA)

Aluminum oxide single crystal medium for volumetric optical memory utilizing 2-photon absorption was developed. Static and dynamic testers were constructed and used for demonstration of bit-wise recording and confocal fluorescent readout

Coffee Break (10:30-10:50)

We-E-05

(10:50) Mechanism of Recording on Electrochromic Information Layers of Multi-Information-Layer Optical Disk using Electrical Layer Selection

K. Kojima, M. Terao (Hitachi, Japan)

Principle of recording on electrochromic information layers is based on local destruction of electrochromism by laser irradiation. The latest features of electrochromism are referred and the detail of recording mechanism is discussed.

We-E-06

(11:10) An Overview of a New Multi-Layer Recording Method by Electrically Coloring a Selected Recording Layer

M. Terao, K. Kojima (Hitachi, Japan)

Electrically-layer-selectable optical disk that has all-transparent multi-recording-layer is proposed. The recording layer is colored only when selected to write/read information. Main aspects of this technology are material and voltage transfer method

We-E-07

(11:30) Two-Dimensional Optical Storage

A. van der Lee, D. Bruls, C. Busch, A. Immink, W. Coene, A. Hekstra (Philips, Netherlands)

2D optical storage aims at increasing the data capacity and data rate for a given physical read-out system. It uses parallel read-out in combination with advanced signal-processing. Experimental results proof the concept.

We-E-08

(11:50) High Density ROM Disk System by Multilevel

Recording

H. Hayashi, N. Minagawa, T. Goto, H. Fujimoto, K. Saito*, M. Kaneko* (Pioneer, Japan, *Sony, Japan)

We developed a high density ROM disk system by multilevel recording with SCIPER and 2DPRML methods. We confirmed its performance by simulation and experiment at the recording densities of 40Gbit/inch² and 100Gbit/inch².

We-E-09

(12:10) Evaluation of Multilayered Waveguide Holographic

Memory Media

K. Ishihara, T. Fujiwara, A. Esaki (Mitsubishi Chemical, Japan)

Multilayered Waveguide Holographic memory media, which is fabricated by the UV embossing process, was evaluated in inclination of the core layer, alignment error, and durability. The results proved the appropriateness of this process.

Lunch (12:30-13:45)

Poster Session I (13:45-15:15)

Presiders: H. Terasaki (Sanyo, Japan)

O. Koyama (Canon, Japan)

We-F-01

Super Resolution ROM Disc using Super-RENS Technology

D. Yoon, J. Kim, H. Kim, I. Hwang, I. Park, D. Shin, Y. Park, J. Tominaga* (Samsung, Korea, *AIST, Japan)

We have confirmed the super-RENS phenomenon in the ROM type media. The CNR was 41.5dB at 150nm pit length using the 635nm red laser system.

We-F-02

Thermal Effect for Readout Mechanism of Super Resolution Near-Field Structure Disk

M. Kuwahara, T. Shima, J. Tominaga (AIST, Japan)

In PtOx-super-RENS disks, we studied the readout threshold power dependence of the disk rotation speed. According to the results and detailed analysis, it was found that heat is the main source of the readout mechanism.

We-F-03

Recording Mechanism of High-Density Write-Once Disks using Inorganic Recording Material

Y. Hosoda, A. Mitsumori, M. Sato, M. Yamaguchi (Pioneer, Japan)

We found the recording mechanism of an inorganic write-once disk for Blu-ray Disc format, which is using a composition of two types of metal nitride for recording material. It is useful for making minute marks.

We-F-04

Optical Disk Replication using Direct Embossing

M. E. Hennessey, D. A. Strand, G. Gutman, T. Ohta (Energy Conversion Devices, USA)

A new direct embossing technique for fabricating optical disks capable of higher production rates and lower costs is presented. The technique is suitable for 0.6 mm and also thinner substrates suitable for dual-layer BD.

We-F-05

Study of Super-Resolution Near-Field Phase Change Optical Disk with a $\text{Sb}_{70}\text{Te}_{30}$ Mask Layer

L. P. Shi, T. C. Chong, H. B. Yao, P. K. Tan, J. M. Li, X. S. Miao, X. Hu (DSI, Singapore)

Super-resolution near-field phase change optical disks with a new mask layer of $\text{Sb}_{70}\text{Te}_{30}$ were studied. The disks were analyzed using optical and thermal simulation and fabricated and characterized.

We-F-06

Ultrafast Laser-induced Phase Transitions in Amorphous $\text{Ge}_1\text{Sb}_2\text{Te}_4$ Films

Q. Wang, L. Shi, K. Yi, X. Miao, M. Hong, T. C. Chong
(DSI, Singapore)

Time resolved microscopy has been used to investigate structure transitions induced by intense 130fs laser pulse in amorphous $\text{Ge}_1\text{Sb}_2\text{Te}_4$ films. Our result shows that an ultrafast nonthermal phase transition occurs within 2.67ps after excitation.

We-F-07

3D FDTD Simulations of Super Resolution Structures

K. Kataja*, J. Olkkonen***, J. Aikio*, D. Howe** (*VTT Electronics, Finland, **Univ. of Arizona, USA)

We have used 3D finite difference time domain modeling to study the writing and reading performance of super resolution structures which have a bulk light scattering center or ring aperture scatter in their active layers.

We-F-08

Analytical Evaluation of the Electromagnetic Fields of a Near-Field Circular Aperture in a Real Conductor at Optical Frequencies

A. V. Itagi, T. E. Schlesinger, D. D. Stancil, J. A. Bain
(Carnegie Mellon Univ., USA)

We calculate the electromagnetic fields of a near field circular aperture analytically. We include real conductor properties to account for the surface plasmon effects at optical frequencies.

We-F-09

Polarising Surface Plasmon Coupler for a Magneto-Optic Pickup Head

H. -B. Pyo, Y. Park, Y. Sohn, H. Ryu, D. Suh, M. C. Paek
(ETRI, Korea)

A structure of waveguide-integrated, polarising surface plasmon coupler was proposed in combination with dielectric as well as physical properties of materials.

We-F-10

Near-Field Scattering Property of Super-RENS Disks

R. Liu, D. Xu, G. Qi (Tsinghua Univ., P.R.China)

Near field scattering property of Super-RENS disks is analyzed using FDTD method, results show that this property is entirely different from conventional optical

disks.

We-F-11

An Integrated Analysis System for Phase-Change Optical Disk

J. M. Li, L. P. Shi, X. S. Miao, K. G. Lim, T. C. Chong
(DSI, Singapore)

An integrated analysis system based on thin film optics, thermal transfer, crystallization and electromagnetics is developed. The issues of mark formation, multi-layer calorific sources, multi-beam heating sources and readout are discussed.

We-F-12

Calculation of Surface Plasmon Effect on Optical Discs

K. P. Chiu, W. C. Lin, Y. H. Fu, D. P. Tsai (Nat'l Taiwan Univ., Taiwan)

Surface plasmons (SPs) were found to play an important role in the trapping of incident radiation into small volume and enhancing the transmitted light through a thin film. We investigate the SPs and LSPs that result from the various features of CD and DVD

We-F-13

Spherical Aberration Detection Scheme for Optical Pickup Units using the Push-Pull Signal

J. Knittel, H. Richter (Deutsche Thomson-Brandt GmbH, Germany)

We present a new method to generate a spherical aberration error (SAE) signal for an optical pickup unit. The SAE signal is derived from two push-pull signals that are generated by a special diffractive optical element.

We-F-14

High Density Recording by Air Stabilized Flexible Optical Disk

N. Onagi, Y. Aman, S. Murata, K. Uchida (Ricoh, Japan)

We worked to stabilize a flexible disk using an air pressure field. We were able to record 0.13um/bit density signals for an air stabilized flexible optical disk.

We-F-15

Effect of Stabilizer in Reducing Effects of Axial Runout on a Flexible Optical Disk

Y. Aman, N. Onagi, S. Murata, K. Uchida (Ricoh, Japan)

The effect of a stabilizer in reducing Axial-runout was demonstrated on a new optical disk system based on a flexible disk and stabilizer.

We-F-16

Development of Signal Interpolated Phase Timing Recovery System for High Density Magneto-Optical Disks

T. Kanaoka, M. Taguchi, A. Uchida, A. Itakura, M. Matsuura (Fujitsu Labs., Japan)

We have developed a new timing recovery method characterized by feed-forward and full digital circuit constructions. The simulation results of the method show that it can detect and adjust the phase correctly.

We-F-17

Front Surface Recording Reliability using a 32 mm Diameter Disk

B. Jr.W. Bell, D. L. Blankenbeckler, J. A. Geohegan, D. G. Howe*, L. W. Lee, S. M. Keeler (DataPlay, USA, *Univ. of Arizona, USA)

The data reliability of a 32 mm front surface recording system including statistical analysis of the ECC subsystem and contamination studies from laboratory, office, bar and kitchen environments is discussed.

We-F-18

Data-to-Wobble Cross Talk Cancellation in Optical Disc Systems

B. Yin, A. Padiy, K. Schep (Philips, Netherlands)

The high frequency data leakage to the push-pull channel decreases the carrier-to-noise ratio of the wobble signal, thus reducing the disc addressing reliability. A cost-effective signal processing method is proposed to deal with this problem.

We-F-19

Miniaturized Optical Pickup and Mechanism for Mobile Optical Disc Drive

M. Togashi, T. Sasaoka, H.-C. Lee*, H.-S. Jeong*, S.-W. Baek* (Samsung Yokohama Research Institute, Japan, *Samsung Electro-Mechanics Co., Korea)

Our 4.75mm height mechanical module can be loaded with a cartridge disc for a blue-LD. The optical system is divided into two parts, and is achromatized for use with a NA0.85 single mold glass lens.

We-F-20

Compatible Objective Lens for Blu-ray Disc and DVD using Diffractive Optical Element and Phase-step Element which Corrects both Chromatic and Spherical Aberration

Y. Komma, Y. Tanaka, S. Mizuno (Matsushita, Japan)

We propose a compatible lens with a diffractive element that overcomes disk thickness difference and longitudinal chromatic aberrations. Phase steps cancel chromatic spherical aberrations. Converging blue and red parallel incident rays are demonstrated.

We-F-21

Photo Replication of Birefringent Phase Structures

E. Versteegen, B. Hendriks, M. van As (Philips, Netherlands)

A new method based on photo replication has been developed to cost effectively mass manufacture birefringent phase structures. These structures allow simple solutions for single objective BD/DVD/CD and BD-dual layer compatibility.

We-F-22

High NA Focusing Grating Coupler for Blu-ray Disc

Y. Sohn, Y. Park, H. -B. Pyo, D. Suh, H. Ryu, M. C. Paek (ETRI, Korea)

A focusing grating coupler (FGC) was designed and fabricated for the use of the blu-ray disk format. The grating pattern of sub-100 nm was fabricated using an inorganic e-beam resist(HSQ).

We-F-23

Design of Optical Flying Head for Near Field Recording

J. Chun, T. Song, K. Park, N. -C. Park, H. -S. Yang, Y. -P. Park (Yonsei Univ., Korea)

We applied the head slider system using in HDD to acquire the stable head gap. The advanced design and fabrication of the OFH (optical flying head) with stable flying and higher optical performance was performed.

We-F-24

Signal Qualification Method for PRML Read/Write Channel

H. Miyashita, T. Nakajima, N. Kimura, Y. Hino, H. Ishibashi (Matsushita, Japan)

We have studied a PRML signal qualification index called MLSE, calculated from mostly mistakable parts of the played-back signal stream. We confirmed that the index is suitable for optimizing read/write PRML channel.

We-F-25

Bit-by-Bit Detection on Super-Resolution Near-Field Structure Disk with Platinum Oxide Layer

H. Fuji, T. Kikukawa*, J. Tominaga** (Sharp, Japan, *TDK, Japan, **AIST, Japan)

Bit-by-bit detection is succeeded in reproducing a recording density of 0.11 μm . After recording a pit position pattern by laser pulses with pre- and post-heating, the pattern is correctly reproduced despite the resolution limit.

We-F-26

Spatial Light Modulator with Magneto-Optic Effect for Volumetric Digital Recording System

J. -H. Park****, J. -K. Cho**, K. Nishimura*, H. Uchida*, M. Inoue***** (*Toyohashi Univ. of Technol., Japan, **Gyeongsang Nat'l Univ., Korea, ***ASTF, Japan, ****JST-CREST, Japan)

We demonstrated a magneto-optic spatial light modulator by one-step pattern growth of iron garnet films on ion-milled substrates by LPE. The novel MOSLM can provide higher resolution, simpler fabrication process, and lower driving current.

We-F-27

Dynamic Refreshing Technique in Photorefractive Memory with Mutually Pumped and Self-Pumped Phase Conjugate Mirrors

H. Funakoshi, A. Okamoto, K. Sato* (Hokkaido Univ., Japan, *Hokkai-Gakuen Univ., Japan)

We propose an all-optical maintenance technique of dynamic hologram in a photorefractive memory. The long-term continuous readout without any hologram fixing can be achieved by the rewriting with the beam resonance between phase conjugate mirrors.

We-F-28

Shift Selectivity Dependence on Speckle Size of a Randomly Phase Encoded Reference Beam

H. Yamatsu, N. Kihara, S. Baba (Sony, Japan)

Shift selectivities of holograms recorded by a randomly phase modulated reference beam were measured as a function of the reference beam speckle size. Holograms were multiplexed based on the experimental result.

We-F-29

Recording of Multi-Level Run-Length-Limited (ML-RLL) Modulation Signals on CD/DVD RW Disk

F. -H. Lo, J. -W. Kuo, N. -H. Tseng, J. -J. Ju, D. Howe* (ITRI, Taiwan, *Univ. of Arizona, USA)

The possibility of recording 3-level RLL modulation signals on standard CD/DVD phase change disk is achieved on this paper. The capacity of recording density can be increased 50% relative to conventional 2-level RLL modulation.

We-F-30

Holographic Memories using 2-Dimensional Phase-Code Multiplexing Method

M. Ezura, S. Baba, N. Kihara (Sony, Japan)

We have presented a new phase-code multiplexing method using a high-resolution 2-d P-SLM to realize a compact and reliable holographic storage system.

We-F-31

Modified PRML Detection using the Relative Probability of the 17PP Code for Optical Storage Systems

J. Lee, J. Lee (Dongguk Univ., Korea)

This paper proposes a modified calculation method of branch metric in PRML detection using the relative probability of the 17PP code for optical storage systems. It can obtain better performance than conventional PRML detection.

We-F-32

Performance Characteristics of a 32mm Small Form Factor Optical Drive and Media.

D. H. Davies, D. L. Blankenbeckler, W. A. Dunford, B. W. Bell, R. H. Hamer (DataPlay, USA)

The experimental data obtained when testing the DataPlay 32mm disc and drive are presented. This includes the performance of this rotary tilt actuator optical drive and media under shock, vibration, temperature and humidity stress environments.

We-F-33

Concept of Generic Disc

M. B. Wang, S. Blanchard, G. Wei, S. Kim (Philips Research East Asia, P.R.China)

This paper proposes a generic disc concept, in which a generic logical format is defined that is independent of the content type and the physical medium. It can be thought of as XML for disc formats.

We-F-34

Irreversible Optical Properties of AgOx Mask Layer for Super-RENS Application Investigated by in situ, ex situ Ellipsometry

X. -Z. Li, S. J. Kim, S. Y. Kim (Ajou Univ., Korea)

Optical Properties of AgOx thin films for Super-RENS application were determined with temperature as the oxygen composition x is varied by using in situ and ex situ ellipsometry.

We-F-35

A New File System for HDTV Optical Disk

K. Ishikawa, D. Koide, M. Kishida, H. Tokumaru, S. Nakamura (NHK, Japan)

We describe the specifications for the optical emulation system, the introduction of an original disk format to provide a new file system for HDTV, and the good results of its evaluation.

Coffee Break (15:15-15:45)

Poster Session II (15:45-17:15)

Presiders: O. Koyama (Canon, Japan)

H. Terasaki (Sanyo, Japan)

We-F-36

Structural Analysis of Amorphous Ge-Sb-Te Thin Film using Nano-Beam Diffraction and High-Resolution Electron Microscopy

M. Naito, M. Ishimaru, Y. Hirotsu, M. Takashima* (Osaka Univ., Japan, Center for Analytical Chemistry and Scientific Inc., Japan)

Amorphous Ge-Sb-Te thin film structure was investigated taking advantage of high-resolution electron microscopy and nano-beam electron diffraction. A pair-distribution function analysis was also performed using electron diffraction intensity profile.

We-F-37

Super Resolution Optical Disc with Reflectance Control Thin Film

M. Yamamoto, G. Mori, H. Tajima, N. Takamori, A. Takahashi (Sharp, Japan)

We obtained the apparent nonlinear optical properties applying stable metal oxide thin film. As a result, we could achieve super resolution ROM disc which has approximately two times higher linear bit density with this reflectance control thin film.

We-F-38

Study the Characterization of GaSbSn Phase Change Material for High Speed Rewritable Media

L. -C. Chung, P. -F. Hsu, M. -C. Chiu, B. -M. Chen (Ritek , Taiwan)

We found that GaSbSn phase change material with high crystallization temperature ($> 200^{\circ}\text{C}$), thermal stability and high crystallization rate could be used in high speed rewritable media.

We-F-39

Near-Field and Far-Field Optical Properties of Au Nanoparticles Super-RENS Structure

Y. H. Fu, F. H. Ho, W. -C. Hsu*, S. -Y. Tsai*, D. P. Tsai (Nat'l Taiwan Univ., Taiwan, *ITRI, Taiwan)

To study the detail functions of this Au cosputtered SiO_2 15 nm thin film, we investigate the near-field and far-field intensity of the focusing spot using near-field scanning optical microscope (NSOM) and Z-scan method.

We-F-40

Phase-Change Optical Media with Enhanced Overwrite Cyclability for the Blu-ray Disc System

K. L. Lee, H. Seo, K. C. Kwak, T. H. Jeong, S. Y. Lee, J. H. Kim (LG Electronics, Korea)

We report some recent results in the rewritable Blu-ray Disc with enhanced overwrite cyclability by using the growth dominant eutectic based $\text{Ge}(\text{Sb}70\text{Te}30)+\text{Sb}$ recording layer, GeN interface layer and write strategy optimization.

We-F-41

Substrate Deformation Studies on Direct-Overwriting (DOW) of Phase-Change Rewritable Optical Disc with Germanium Nitride Interface Layers

P. K. Tan, L.-P. Shi, H Meng, X.-S. Miao, K. P. Wong, T.C. Chong (DSI, Singapore)

We have studied the deformation of polycarbonate substrate during DOW process of phase-change optical disc with Ge-N interface layers. The interface layer has multiplied the substrate deformation DOW life time by

about 100 times.

We-F-42

Plastic Substrate with High Performance Using A New Polycarbonate with addition of an Antiplasticizer (3)

H. Sasaki, I. Akihara, M. Ueda

(Mitsubishi Engineering-Plastics, Japan)

A cost effective new antiplasticizer as an additive of polycarbonate was studied for high-density optical disk substrates. The excellent molding performance, durability, and little warpage change by moisture absorption were demonstrated.

We-F-43

Explosive Crystallization in High Speed Solidification Films of Phase Change Optical Memory

M. Okuda, H. Inaba*, S. Usuda** (Okuda Technical Office, Japan, *Osaka Prefecture Univ., Japan, **Osaka Prefectural College of Technol., Japan)

From the discussion of excess Sb effect for the dynamics of rapid crystallization, it is concluded that the materials having more large latent heat is necessary to obtain the high line speed optical disk.

We-F-44

The Process for Developing Recording Materials of Phase-Change Optical Media using MediaTest-I and Simulation Technique

K. Kinoshita, R. Mori (Mitsubishi Materials, Japan)

The temperature dependent crystallization characteristics of phase-change materials was investigated by using both the static test system MediaTest-I and simulation technique.

We-F-45

Eight to Twelve Modulation Code for High Density Optical Disk

K. Kayanuma, C Noda*, T. Iwanaga (NEC, Japan, *Toshiba, Japan)

We propose a fixed rate DC-free (d,k) run-length limited modulation code, which is suitable for high-density read channel and PRML detection.

We-F-46

Auto-adjusting the Photo-Detector in an Optical Head System for Optimum Focus

S. -J. Wang, S. -K. Lin (Nat'l Chiao Tung Univ., Taiwan)

An auto-adjusting method for moving the photo-detector to the correct position in the assembly of an optical head system is proposed. The adjusting procedure is formulated as an optimization problem with parameters trained by a neural network method.

We-F-47

Signal-to-Noise Ratio in a PRML Detection

S. Ohkubo, M. Ogawa, M. Nakano, H. Honma, T. Iwanaga (NEC, Japan)

The general expression of SNR in a PRML detection has been derived. The derived SNR can be easily determined with hardware, and it has been confirmed that the SNR correlates well with the actual bit-error-rate.

We-F-48

Optimization of Write Conditions with a New Measure in High Density Optical Recording

M. Ogawa, M. Nakano, S. Ohkubo, H. Honma, T. Ichimura, T. Iwanaga (NEC, Japan)

A new measure PRSNR, which can evaluate signal quality in a PRML detection instead of jitter, was adopted to adjust write conditions in high density optical recording.

We-F-49

A New Error Correction Algorithm for High Density Optical Storage Systems

Y. Kim, J. Lee, J. Lee (Dongguk Univ., Korea)

We propose a new error correction technique for high-density optical storage system using syndrome check. The advantages are (1) easy code rate adjustment and (2) simple code construction (less inner code encoding and decoding time).

We-F-50

Independent Erasure Decoding Technique of 2-Dimensional ECC using the Erasure Information of Modulation Code

J. Lee, B. Lee, J. Lee, B. Jun*, J. Lee* (Samsung, Korea,
* Dongguk Univ., Korea)

We propose an independent erasure decoding technique of 2-dimensional error correction code (2D-ECC) using the erasure information from the modulation code decoder. Conventional 2D-ECC applying the proposed technique achieves the incredible performance.

We-F-51

Leaky-Mode Directional Coupler for Miniaturized Optical Pickup Head

Y. Park, Y. Sohn, H. -B. Pyo, M. C. Paek, H. Ryu, D. Suh (ETRI, Korea)

A focusing waveguide grating coupler (FWGC) comprising a leaky-mode directional coupler and a reflecting Fresnel lens is proposed and designed for future miniaturized optical pickup head. Compared to other FWGCs, this composite FWGC provides the efficient

We-F-52

Ultra Small Optical Pickup Module with Integrated Optics

Y. -S. Kim, S.-C. Kim, S. -H. Lee., M. -H. Lee, J. -Y. Kim (LG Electronics, Korea)

We have developed an ultra small optical pickup module integrated with wafer based optics for phase change disc and ROM disc and could be applied to the optical disc drive of 5mm height.

We-F-53

The mechanical filter on the actuator for system stability of the 9.5mm drive

B. Y. Song, H. J. Kang, W. I. Cho, B. R. Ryoo, P. Y. Seong, K. H. Lee, D. J. Lee*, N. C. Park*, Y. P. Park* (Samsung, Korea, *Yonsei Univ., Korea)

To secure relative stability of servo system of the 9.5mm drive, we developed the mechanical filter on the actuator using re-design of mode shape, instead of an additional electrical filter on a circuit board.

We-F-54

Interference Pattern Analysis and Auto-Alignment

Method of Focusing Unit for NFR System

H. -K. Yoon, J.-H. Lee, J. H. Jeong, S. -T. Lee*, D. -G. Gweon (KAIST, Korea, *Chongju Univ., Korea)

In the viewpoint of the assembly, the interference pattern analysis of the focusing unit of NFR system is performed and the concept of auto-alignment using the pattern recognition of by the neural network is proposed.

We-F-55

Dependence of Differential Phase Detection Signals on Astigmatism in a Focused Spot

M. Shinoda, K. Nakai, K. Mori (Mitsubishi, Japan)

The tracking error signals of the differential phase detection (DPD) method in case that a focused spot has an astigmatism are simulated. The effects in several types of the DPD method are described.

We-F-56

Growth and Two-Color Holographic Storage Properties of Mn-doped Lithium Niobate Crystals with Varying Li/Nb Ratio

Y. Liu, K. Kitamura, G. Ravi, S. Takekawa, M. Nakamura, H. Hatano* (Nat'l Inst. for Materials Science, Japan, *Pioneer, Japan)

Near-stoichiometric $\text{LiNbO}_3:\text{Mn}$ crystals with excellent two-color holographic recording characteristics were grown by the TSSG method using Li-rich melt.

More stoichiometric crystals possessed better two-color holographic storage performances.

We-F-57

Speckle-Multiplexed Holographic Memory with Photorefractive Beam-Fanning Effect

M. Bunsen, A. Okamoto (Hokkaido Univ., Japan)

We propose a hologram multiplexing method with the speckled reference beam generated by the photorefractive beam-fanning effect. Four multiplexed holograms are successfully retrieved with the reference beam speckled by the effect in a BaTiO_3 crystal.

We-F-58

Design of Dye Concentrations in Azo Polymer Films for

Volume Holographic Storage

J. Minabe, T. Maruyama, S. Yasuda, K. Kawano, K. Hayashi, Y. Ogasawara (Fuji Xerox, Japan)

We fabricated 250 μ m thick azo polymer films with high diffraction efficiencies of ~ 25 % by controlling dye concentrations in the films. Holographic recording of 20-multiple data pages was demonstrated using the optimally designed film.

We-F-59

Intensity-Dependent Excitation of Metallic Nanoparticles Nonlinear Layer for Super-RENS

F. H. Ho, K. Borgohain, H. M. Chen, R. S. Liu, S. -F. Hu*, D. P. Tsai (Nat'l Taiwan Univ., Taiwan, *Nat'l Nano Device Labs., Taiwan)

An uniform and monolayered gold nanoparticle film was fabricated. The optical nonlinearity was studied by Z-scan method. The film show an intensity-dependent enhanced transmittance due to local plasmon excitation.

We-F-60

Nonlinear Change of Optical Properties and Super Resolution Effects on Optical Disks of Co₃O₄ thin films

H. Yamamoto, S. Tanaka, T. Naito*, K. Hirao** (New Glass Forum, Japan, *Hitachi, Japan, **Kyoto Univ., Japan)

Optical absorption coefficient of Co₃O₄ films decreased with increasing laser intensity, which was consistent with the change induced by thermal treatment. Nonlinearity of reflectance of optical disk with the film was also observed.

We-F-61

Holographic Recording on Azobenzene Functionalized Polymer Film

M. Itoh, T. Yatagai, K. Harada*, S. Kamemaru* (Univ. of Tsukuba, Japan, *Kitami Inst. of Technol., Japan)

New holographic recording using photoinduced surface deformation is proposed. The relief is fabricated onto azobenzene functionalized polymers. Electrically controlled diffraction efficiency and second harmonics reconstruction are discussed.

We-F-62

Three-Dimensional Optical Storage with Photosensitive Fluorescent Material

C. -W. Chen, L.-C. Liu, C. -C. Lee, A. T. Hu, M. C. Li*, W. -Y. Liao* (Nat'l Tsing Hua Univ., Taiwan, *ITRI, Taiwan)

We propose a new three-dimensional optical storage medium in which a confocal laser-scanning microscopy is applied for multilayer fluorescence readout. The contrast of signal intensity for inside and outside of the pit can reach 71%.

We-F-63

A Material Development toward Long Cyclic Super-Resolution Readout and Writing

B. -K. Cheong, H. S. Lee*, T S. Lee, K. S. Lee, W. M. Kim, J. Lee**, S. Cho** (Korea Inst. of Science and Technol. Korea, *Korea Univ., Korea, **SKC., Korea)

A report is made of a new super-resolution(SR) material that was found from static and dynamic ROM tests to hold a promise for long cyclic SR readout and writing as well.

We-F-64

Volume Change Thermal Lithography Technique for Mastering Process

M. Kuwahara, J. Kim*, J. Tominaga (AIST, Japan, *Samsung, Korea)

We report that dot formations with a diameter less than 100 nm in ZnS-SiO₂/TbFeCo/ZnS-SiO₂ multilayer by the volume change and thermal lithography technique.

We-F-65

The Microstrip Probe with Golden Strips in Infrared Optical Waveband for Optical and Magnetic Data Storage

A. S. Lapchuk, S. -W. Baek, H. -S. Jeong, C. -S. Kyong (Samsung, Korea)

Mathematical simulation of a microstrip probe with golden metal strips working on infrared wavelength has shown that it can have small spot size (down to $d=3\text{nm}$), small transmission losses 2 dB and field enhancement over 100000.

We-F-66

OFDM with Multi-Level Technology in Optical Storage Application

C. -P. Ma, J. -W. Kuo (ITRI, Taiwan)

We apply OFDM in the optical storage system. We equalize the channel and correct the sampling frequency error in the frequency domain. The recording data density is 2.6 times of that of DVD.

We-F-67

High Robustness against Unlawful Access in Photorefractive Authentic Memory with Two-Wave Encryption Method

A. Mita, A. Okamoto, H. Funakoshi (Hokkaido Univ., Japan)

We evaluate the robustness of our memory system by examining the output beam intensity and the correlation coefficient between the output image and the original image in the retrieving process with unspecified keys.

We-F-68

Format of Optical Disk with Limited Number of Times of Multiple Playback

G. -Z. Wu, Z. -W. Chao, Y. -J. Wang, N. -H. Tseng, S. -C. Chen (ITRI, Taiwan)

A ROM disk format containing a rewritable part is proposed.

We-F-69

A New Run-Length Limited (2,7) Parity Preserving Code Limiting the Repeated Minimum Transition Run for Optical Storage

H. -S. Hong, J. -J. Lee (Dongguk Univ., Korea)

An RLL (2,7) parity preserving code limiting the number of repeated minimum transition run to 4 is presented. It has the code rate of 0.5 with 96.6% code efficiency, and several experimental results are presented.

We-F-70

**Optical Disk Drive Tester with Atomic Force
Microscope for Nano Scale Observation**

M. Kuwahara, K. Honma*, A. Egawa*, T. Miyatani*, K.
Nakajima*, J. Tominaga (AIST, Japan, *Seiko Instruments,
Japan)

We developed an advanced optical disk drive tester
combined with AFM (ADD-AFM) and demonstrate the
high performance for the nano-meter scale measurement of
topography of particular pit patterns on disk surface.

We-F-71

**Demonstration of Potentiality for 100 Mbps of High
Data Transfer-Rate on an Optical Disk with 40 Gbit/
inch² of High Areal Density**

T. Maeda, T. Shintani (Hitachi, Japan)

We introduced a laser of SHG to a light source and
developed a pre-amplifier with low noise and a wide band
width to test an optical disk with 40 Gbit/in² and 100 Mbps.

Gagaku (17:45-18:15)

(Noh Theatre)

Banquet (18:15-20:15)

(Reception Hall)

November 6, 2003 (Thursday)

Components (9:00-12:05)

Presiders: Y. Honguh (Toshiba, Japan)

A. Takahashi (Sharp, Japan)

T. D. Milster (Univ. of Arizona, USA)

Th-G-01 (Invited)

(9:00) Blue/DVD/CD Compatible Optical Head Technologies

R. Katayama (NEC, Japan)

Principles and optical configurations for realizing blue/DVD/CD compatibility are explained, including spherical aberration correction and NA control methods for each disk. Examples of optical design specifications and experimental results are also shown.

Th-G-02

(9:25) High-Power UV Light Generation in a Periodically

Poled Bulk MgO:LiNbO₃

A. Morikawa, T. Sugita, K. Kasazumi, K. Mizuuchi, K. Yamamoto (Matsushita, Japan)

We have demonstrated high-power UV light generation (340-372nm) using a highly efficient SHG device. CW SHG of 72mW at wavelength of 372-nm was generated with conversion efficiency of 12%.

Th-G-03

(9:45) An Advanced Magnetic Coil for Magneto-Optical

Recording with a Large Working Distance

H. Yoshikawa, T. Matsumoto, T. Fujimaki, K. Tezuka (Fujitsu Labs., Japan)

We developed an MFM coil with a stick-shaped magnetic layer and a heat sink, and confirmed a data transfer rate of 60 Mbps at a WD of 30 μ m in tests with a drive.

Th-G-04

(10:05) Lens Design of Compatible Objective Lens for

Blu-ray Disc and DVD with Diffractive Optical

Element and Phase-Steps

Y. Tanaka, Y. Komma, Y. Shimizu, T. Shimazaki, J. Murata, S. Mizuno (Matsushita, Japan)

We have developed a BD/DVD compatible objective lens that employs a diffractive-refractive hybrid configuration. First order diffracted light is used for DVDs and second order light for BDs. Use of phase steps reduces chromatic spherical aberration.

Coffee Break (10:25-10:45)

Th-G-05

(10:45) BD/DVD Recording and Reproducing Compatible Use Technology in the 2nd Generation Pick Up for Blu-ray Disc

H. Shindo, I. Morishita, N. Takeya, H. Jeong*, Y. Yoon*, I. Chang*, H. Kim*, D. Lee*, J. Oh*, C. Kyong* (Samsung Yokohama Research Inst., Japan, *Samsung Electro-Mechanics, Korea)

We developed a 2nd generation Pick Up for Blu-ray Disc (BD) that is compatible with BD/DVD record reproduction, and a AV/PC combination size using a single object lens and a hologram element.

Th-G-06

(11:05) An Optical Flying Head Assembly for a Small Form Factor Plastic Disk in the PCMCIA like Drive

S. Kim, J. Park, G. Park, J. Lee, J. Lee, H. Jung, J. Y. Kim, S. H. Kim, Y. Yee*, J. U. Bu (LG Electronics, Korea)

For mobile application of small form factor ODD, we study effective design and performance of optical flying head for first surface recording on removable plastic disk. Flyability and reliability are investigated with respect to parameters of disk.

Th-G-07

(11:25) DWDD Magneto-Optical Drive for Mobile Use, with 15 Gbit/inch² Recording Density and 24 Mbps Data Transfer Rate

C. Nagura, S. Torii, K. Ishii, O. Nagatsuka, K. Nishikawa, Y. Miyaoka, K. Suzuki, O. Koyama (Canon, Japan)

We have developed a DWDD magneto-optical drive especially for the mobile use, realizing 15 Gbit/inch² recording density and 24 Mbps data transfer rate. The volume and power consumption of the drive are 35.5 cc and 0.78 W, respectively.

Th-G-08

(11:45) Blu-ray Disc / DVD Compatible Objective Lens

Assembly

K. Takada, J. Hashimura, Y. Ori, N. Mushiake (Minolta, Japan)

We developed a Blu-ray Disc / DVD compatible objective lens assembly using a wavelength selective hologram element. The objective lens assembly has advantages of high diffractive efficiency, fine tracking characteristics and low chromatic aberration.

Lunch (12:05-13:30)

Optical Storage Systems & Applications, Testing Methods & Devices (13:30-15:35)

Presiders: K. Tanaka (Teikyo-Heisei Univ., Japan)

T. Maeda (Hitachi, Japan)

Th-H-01(Invited)

(13:30) Mapping the Temporal Dynamics of Phase-Change

Processes

A. Euteneuer (TOPTICA Photonics, Germany)

A red wavelength version and a violet wavelength version of our two-laser static disk-tester are used to study experimentally the temporal dynamics of phase-change processes in various data-storage media. Selected results are compared and discussed.

Th-H-02

(13:55) Molecular Dynamics Simulations for the Aggregation of Silver Clusters in the AgOx Type Super-resolution Near-Field Structure

B. S. Lin, D. P. Tsai*, W. C. Lin* (Nat'l Center for High-Performance Computing, Taiwan, *Nat'l Taiwan Univ., Taiwan)

The dynamic behavior for the aggregation of silver clusters in the AgOx-type super-resolution near-field structure are simulated by employing the fourth order symplectic integrators.

Th-H-03

(14:15) Page-Based Holographic Data Storage Devices

D. H. Raguin, C. J. Butler, E. S. Kolb, D. A. Waldman (Aprilis, USA)

We present accelerated lifetime tests and data density achievements for Aprilis CROP photopolymer and present a prototype of the Aprilis DHD(TM) holographic drive enabling removable storage capacities in excess of 200 GB.

Th-H-04

(14:35) Characteristics on the Writing Method with Leading Erase Beam using Multi-Beam Laser Diode

K. Ogihara, S. Yamada, H. Owa, K. Munekata, T. Noshiro, S. Yamazaki, O. Adachi, K. Aga, M. Masuda, K. Sato (Sony, Japan)

We show the possibility of double speed writing by using the two beam writing method with a leading beam dedicated for erasing. A method to determine the erase power and write power is also shown.

Th-H-05

(14:55) All-Optical Data Restoring Method for Photorefractive Holographic Memory

T. Ito, A. Okamoto, S. Homma, M. Toishi (Hokkaido Univ., Japan)

Nondestructive readout and data restoring can be all-optically achieved by continuous refreshing of a pair of holograms in a photorefractive crystal. We show the optimum conditions for nondestructive readout and the

required time for restoring.

Th-H-06

(15:15) Study of the System Stability against Fingerprints on Blu-ray Disc System

T. Higuchi, H. Kobayashi, K. Takahashi, T. Imai (Pioneer, Japan)

To realize a cartridge-free Blu-ray Disc system, the development of countermeasures against fingerprints is one of essential tasks. We discuss about detection methods of failure of drive systems due to serious fingerprints.

Coffee Break (15:35-15:55)

Media II (15:55-18:25)

Presiders : T. Iida (Pioneer, Japan)

J. van Haaren (Philips, Netherlands)

Th-I-01 (Invited)

(15:55) Progress in Electron Beam Mastering for 100Gbit/inch² Density

M. Takeda, M. Furuki, M. Yamamoto, M. Shinoda, K. Saito, Y. Aki, H. Kawase, M. Koizumi*, T. Miyokawa*, M. Mutou*, N. Handa* (Sony, Japan, *JEOL, Japan)

Recent progress in electron beam mastering process is presented and capability of 100Gbit/inch² density recording will be discussed.

Th-I-02 (Invited)

(16:20) Liquid Immersion Deep-UV Optical Disc Mastering for Blu-ray Disc ROM

H. van Santen, J. H. Neijzen, E. R. Meinders (Philips, Netherlands)

The NA of a deep-UV Mastering system has been increased through liquid immersion with the aim of mastering the 25 GB ROM discs of the Blu-ray Disc generation. Bottom jitters under 5% have been obtained.

Th-I-03**(16:45) Acid-Breakable Resin-Based Chemical Amplification Positive Resist for Electron-Beam Mastering: Design and Lithographic Performance**

T. Sakamizu, H. Shiraishi (Hitachi, Japan)

A positive chemical amplification resist based on acid-catalyzed fragmentation of acetal groups in its main-chain has been developed for electron-beam mastering.

Th-I-04**(17:05) High Density ROM Disc Mastering using Direct Focus LBR**

T. Kondo, E. Nakagawa, T. Tsurukubo, T. Ohgo, T. Onizawa, M. Kai (JVC, Japan)

The paper describes performance of the mastering by a direct focus laser beam recorder equipped a DUV light source. It exhibits stable recording with lower jitter and successfully realizes a 25 GBytes capacity Read-Only-Memory disc.

Th-I-05**(17:25) Electron Beam Recorder with Nanometer Positioning Accuracy for 100Gbit/in² Density Mastering**

H. Kitahara, Y. Ozawa*, M. Asai*, T. Nishida**, Y. Wada (Pioneer, Japan, *Fujitsu Labs., Japan, **Hitachi, Japan)

We developed an electron beam recorder (EBR) for 100Gbit/in² density mastering. By adopting a high-accuracy rotation stage and a correction system of rotation errors, we achieved a recording accuracy of around 2nm in both radial and tangential directions.

Th-I-06**(17:45) Study on 100Gbit/inch² Density Molding using Double-Sided Heat Insulated Mold**

K. Inoue, K. Hayashi, Y. Kawasaki, E. Ohno, S. Masuhara*, M. Kaneko* (Matsushita, Japan, *Sony, Japan)

We obtained 100Gbit/inch² density substrates, which had no pit deformation over the entire pit area and small radial tilt by adopting the combination of the double-sided insulated mold and the low mold opening speed.

Th-I-07

(18:05) Improvement of Electron Beam Mastering using Dry Etching Process

O. Kasono, M. Sato, T. Sugimoto, Y. Kojima, M. Katsumura (Pioneer, Japan)

We adopted a reactive ion etching process for the disk mastering and confirmed that the jitter was affected by both the surface roughness and the scattering electrons.

November 7, 2003 (Friday)

High Density Recording II (9:00-12:05)

Presiders : Y. Kawata (Shizuoka Univ., Japan)

K. Ueyanagi (Fuji Xerox, Japan)

H. P. D. Shieh

(Nat'l Chiao Tung Univ., Taiwan)

Fr-J-01 (Invited)

(9:00) Signal Characteristics of Super-RENS Disk at Blue Laser System

J. Kim, I. Hwang, H. Kim, D. Yoon, I. Park, D. Shin, Y. Park, J. Tominaga* (Samsung, Korea, *AIST, Japan)

The super-RENS effect was confirmed not only at the red laser system (wavelength 635 nm, N.A. 0.65) but also at the blue laser system (wavelength 405 nm, N.A. 0.85).

Fr-J-02

(9:25) High Resolution Read-out using a Near-Field Optical Probe Embedded in a Condensed Lens

N. Kojima, A. Mishima, K. Watanabe (Sony, Japan)

We present the novel near-field optical head structure in which the probe is embedded in the condensed lens system. Periodic signals generated by the probe are detected from 100nm wide land patterns.

Fr-J-03

**(9:45) Surface Plasmon Polariton Assisted Resonant
Transmission of Evanescent Light through Nano
Apertures on a Grating Patterned Thin Gold Film
Covered over GaP Optical Disk Head of VCSEL and
Microlens Array**

K. Goto, T. Kirigaya, Y. Masuda (Tokai Univ., Japan)

Evanescent light power enhancement by resonance on nano-meter sized thin gold metal grating structure covered over semiconductor material optical disk head is described. More than 500 times increment is observed by 2D-FDTD simulation

Fr-J-04

**(10:05) Advanced Lens Design for Bit-Wise Volumetric
Optical Data Storage**

T. Milster, Y. Zhang, S. Park, J. Kim* (Univ. of Arizona, USA, *Seoul Nat'l Univ., Korea)

Lens design of far-field and near-field volumetric bit-wise optical data storage is presented, and the maximum surface density of each design is calculated

Coffee Break (10:25-10:45)

Fr-J-05

**(10:45) Metal-Free Organic Material as a Mask Layer for
Super-RENS Disk**

T. Shima, M. Kuwahara, T. Fukaya, T. Nakano, J. Tominaga (AIST, Japan)

We have prepared super-RENS disk with no metal particles using phthalocyanine as a mask layer. Super-resolutional readout (wavelength: 635 nm, NA: 0.6) with CNR exceeding 40 dB at 200-nm mark was achieved.

Fr-J-06

**(11:05) Write-Once Multilayer Optical Disk using Transparent
Recordable Material with an Optical Switching Layer**

F. H. Wu, T. D. Milster*, H. P. D. Shieh (Nat'l Chiao-Tung Univ., Taiwan, * Univ. of Arizona, USA)

A structure of multiple transparent films with optical

switching layer as recordable media is proposed to increase the number of recording layers in a multilayer disk.

Fr-J-07

(11:25) Microexplosion Recording in Spin-Coated Polymer Films Including ZnO Nanoparticles for 3D Optical Memory

T. Shiono, H. Yamamoto, S. Nishino (Matsushita, Japan)

We proposed spin-coated polymer films including ZnO nanoparticles for write-once multilayered media that can be read at violet wavelength. It was demonstrated that microexplosion sensitivity was greatly improved for short-pulsed laser beams.

Fr-J-08

(11:45) Optical Reproduction of a Series of Images by a Simple Hologram Multiplexing Method of Rotating a Fiber Bundle

Y. Okazaki, Y. Takayama*, E. Watanabe, K. Kodate (Japan Women's Univ., Japan, *Communications Research Labs., Japan)

We present a simple optical setup for hologram multiplexing using a fiber bundle with a rotatory movement. We recorded 100 sample holograms experimentally and regard the series of read out images as an animation.

Lunch (12:05-13:30)

Post-deadline Papers (13:30-14:30)

The best 4 post-deadline papers are orally presented.

Awards, Announcement of ISOM2004 and Closing Remarks (14:30-15:00)

J. Tominaga (AIST, Japan)

Program Committee, Chairperson

Technical Tour (15:30-18:00) :

Sharp Memorial & Technology Hall

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Tateishi, K.	Tu-D-02		
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Wang, M. B.	We-F-33
Wang, Q.	We-F-06
Wang, S.-J.	We-F-46
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Wu, G.-Z.	We-F-68
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Yamamoto, H.	We-F-60
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Yamatsu, H.	We-F-28
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Yao, H. B.	We-F-05
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Yoon, H.-K.	We-F-54
Yoon, Y. H.	Th-G-05
Yoshida, N.	Tu-B-06
Yoshikawa, H.	Th-G-03
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Zakharian, A. R.	Tu-C-01
Zhang, Y.	Fr-J-04

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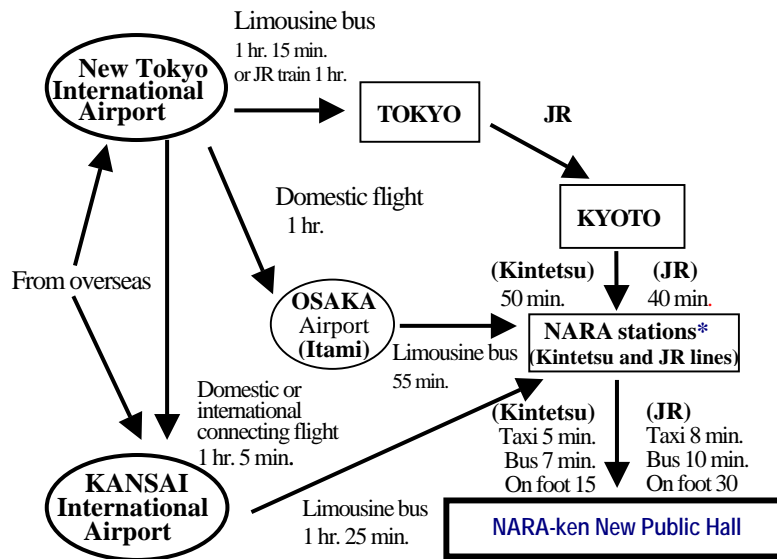
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How to get to Nara



Access to the Nara-ken New Public Hall (Shin-Kokaido)

Participants from abroad will arrive at New Tokyo International Airport (Narita) or Kansai International Airport. Access from these airports to the Shin-Kokaido is as follows.

From Narita to Kansai or Osaka Airport (Itami)

By domestic flight: 1 hour.

From Kansai Airport to Nara stations (Kintetsu or JR)

By Limousine bus: 85 min.

From Itami to Nara stations (Kintetsu or JR)

By Limousine bus: 55 min.

From Kintetsu Nara Station to the Nara-ken New Public Hall (Shin-Kokaido)

By walk: 15 min., By Bus: 7 min., By Taxi: 5 min.

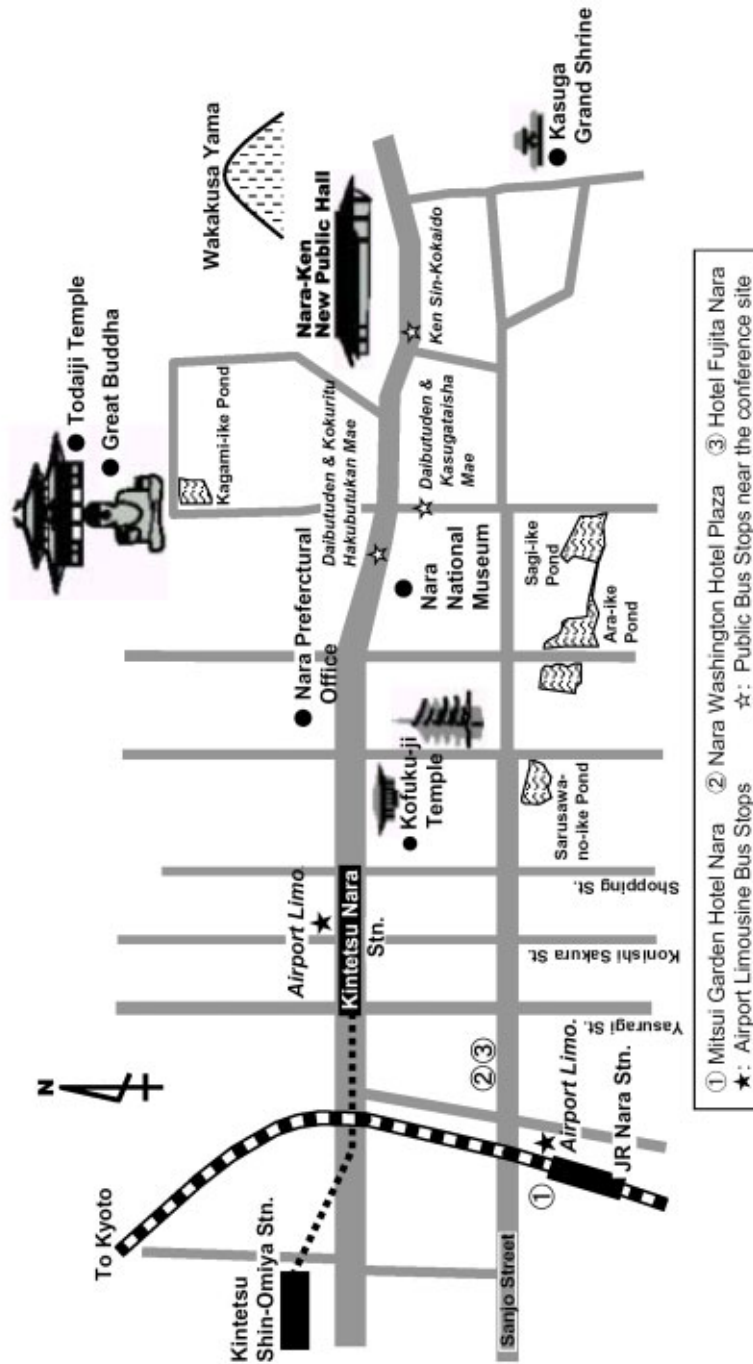
From JR Nara Station to the Nara-ken New Public Hall (Shin-Kokaido)

By walk: 30 min., By Bus: 10 min., By Taxi: 8 min.

For more information, please refer to the following WWW address:

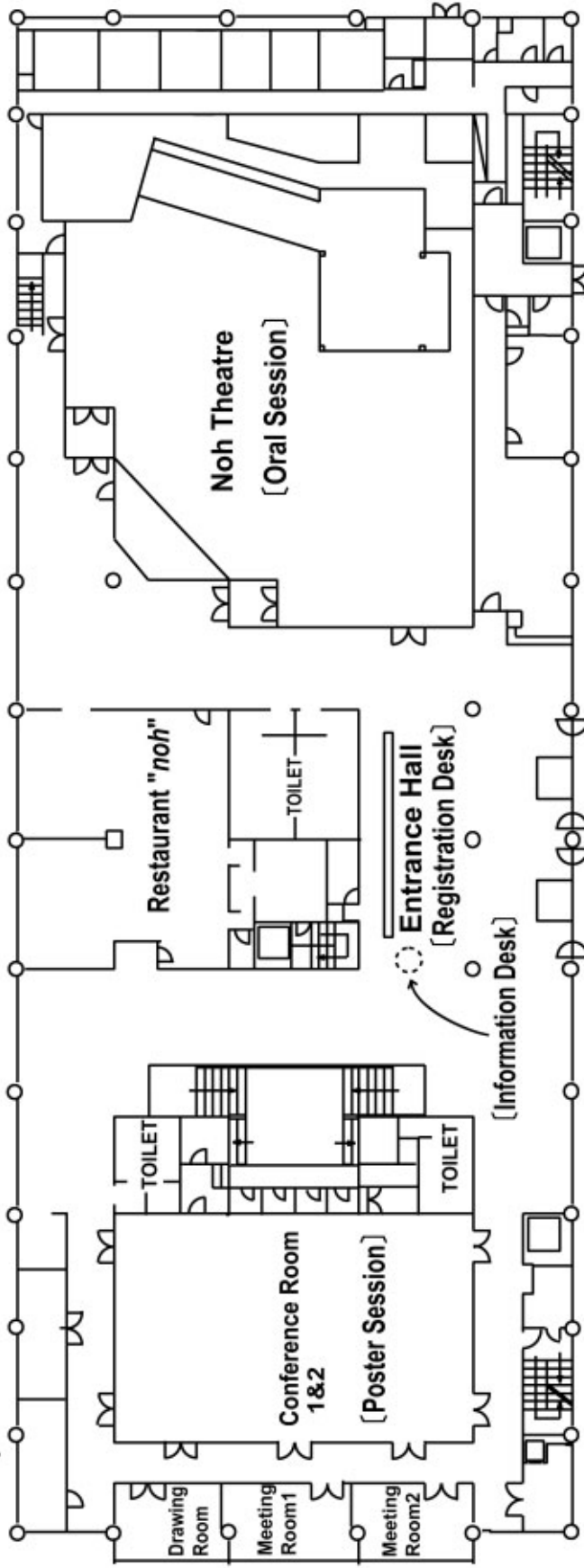
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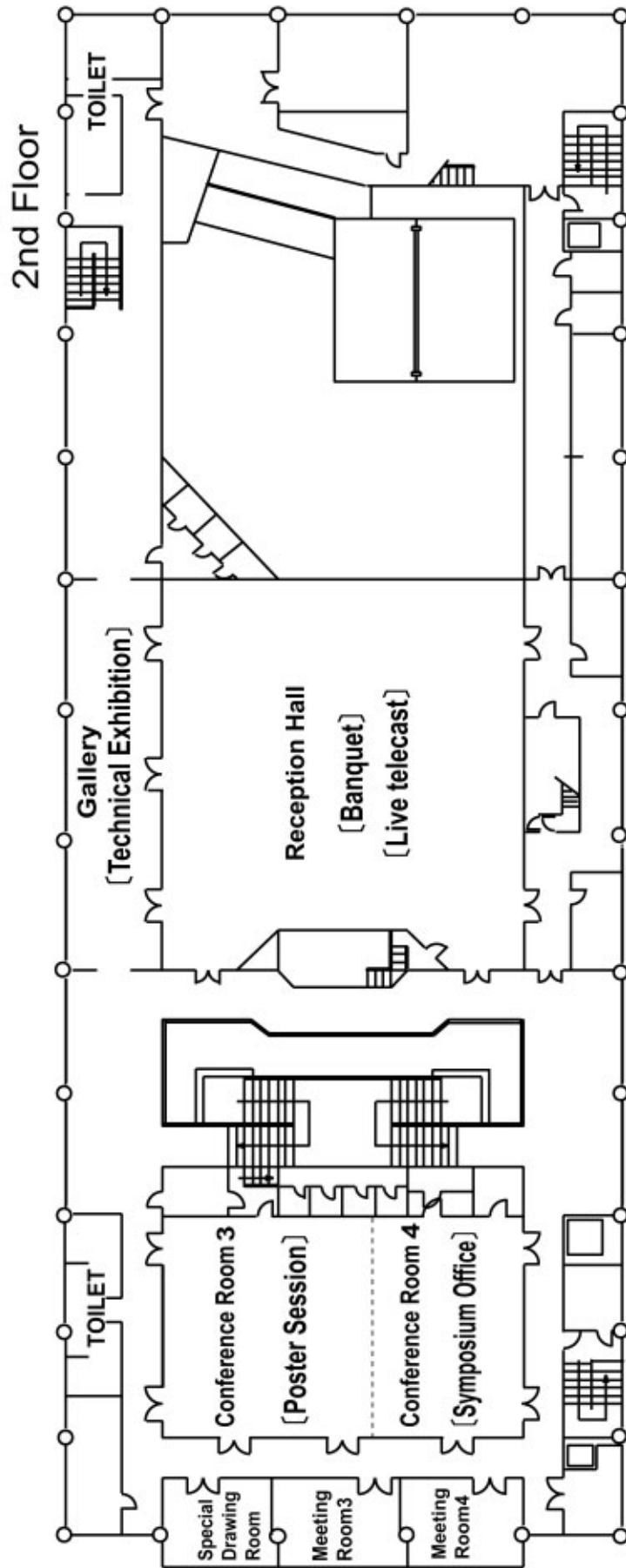
Access to the Nara-ken New Public Hall



Floor Map of Nara-ken New Public Hall

1st Floor







Nara-ken New Public Hall and its Japanese garden

MEMO



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