A digest of technical papers presented at the Topical Meeting on Optical Data Storage, October 15-17, 1985, Washington Hilton Hotel, Washington, D.C.

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MONDAY, OCTOBER 14, 1985

CONCOURSE LEVEL LOBBY
7:30 AM–8:00 PM REGISTRATION

MILITARY ROOM
8:30 AM–5:00 PM
SHORT COURSE ON OPTICAL DATA STORAGE
Alan E. Bell, IBM Research Laboratory; Alan B. Marchant, Eastman Kodak Company, Instructors.

CONCOURSE LEVEL LOBBY
6:00 PM–8:00 PM REGISTRATION/REFRESHMENTS

TUESDAY, OCTOBER 15, 1985

CONCOURSE LEVEL LOBBY
7:30 AM–4:00 PM REGISTRATION

INTERNATIONAL BALLROOM EAST

OSA ANNUAL MEETING SYMPOSIUM ON ADVANCES IN LASER DIODES
Donald R. Scifres, Spectra- Diode Laboratories, Presider

8:30 AM Invited paper
TuG1 Phase-Locked Semiconductor Laser Diode Arrays.
W. Streifer, D. R. Scifres, P. S. Cross, D. F. Welch, R. D. Burnham, U. New Mexico. Phase-locked semiconductor diode laser arrays capable of emitting light at high power in low divergence beams are described.

9:00 AM Invited paper
TuG2 Laser Diode Arrays for Optical Pumping of Nd:YAG.
Danny J. Krebs, McDonnell Douglas Astronautics Company–St. Louis. Advances in GaAlAs growth technology, processing techniques, and array pump configurations which make diode pumping of high-power Nd:YAG lasers possible are discussed.

9:30 AM Invited paper
TuG3 Individually Addressable Monolithic Arrays of AlGaAs Diode Lasers.
Donald B. Carlin, RCA Laboratories. Monolithic, linear arrays of individually addressable high-power AlGaAs diode lasers have been developed with particular application to optical data storage.

10:00 AM
TuT1 Compact Linear Array External Cavity Laser. D. L. Begley, D. Martin, W. Vivian, R. Rice, McDonnell Douglas Astronautics Co. Successful operation of a compact linear array external cavity laser, exhibiting wavelength control of individual diode elements and phase-locked operation, was demonstrated. Extension to high-power applications is discussed.

10:15 AM
TuT2 Phase-Locked Laser Array Formed by Induced Filaments. J. Salzman, A. Larsson, A. Yariv, California Institute of Technology. Lasing filaments in broad area semiconductor lasers were induced by etched end-mirrors. The controlled filaments form a phase-locked array emitting in the fundamental supermode.

10:30 AM
TuT3 Individual Spatial Modes of a Phase-Locked Injection Laser Array. J. R. Andrews, T. L. Paoli, William Streifer, R. D. Burnham, Xerox Corp. The oscillating spatial modes of a phase-locked AlGaAs injection laser array are observed through spectral selection and individually selected with an external mirror.

10:45 AM
TuT4 Lateral-Mode Analysis of Semiconductor-Laser Arrays. Govind P. Agrawal, AT&T Bell Laboratories. The lateral near- and far-fields of gain-guided and index-guided semiconductor-laser arrays are analyzed after including the effects of carrier-induced gain and index changes.

11:00 AM
TuT5 Numerical Simulation of Injection Locking of Diode Laser Arrays. G. Ronald Hadley, Sandia National Laboratories. We present numerical calculations of the far- and near-field patterns of a five-stripe gain-guided diode laser array which has been injection locked by injecting into a single end stripe.

11:15 AM

Es gibt von den papers TuG1 – TuT10 nur abstracts.

Vh. in: Optical Society of America. Journal A.

202 450 (2/13, J. PM-Pr2)
TUESDAY, OCTOBER 15, 1985—Continued

11:30 AM

11:45 AM
Tul8 Coherent Ensemble of Diode Lasers with Feedback in the Fourier Plane. R. H. Rediker, K. K. Anderson, C. Corcoran, Massachusetts Institute of Technology. The spectral linewidth of the coherent ensemble of five diode lasers is less than 7.5 MHz. Preliminary results for various modes of pulsed operation are also described.

12:00 NOON

12:15 PM
Tul10 Coupled Modes of Phased Array Lasers. Amos Hardy, William Streifer, U. New Mexico. A new theory describing array mode (supermode) propagation in phased semiconductor arrays is developed. Radiation patterns produced by various geometries are discussed.

12:30 PM LUNCH BREAK

INTERNATIONAL BALLROOM WEST

1:30 PM OPENING REMARKS
Alan E. Bell, IBM Research Laboratory, Program Cochair

ERASABLE SYSTEMS
Alan E. Bell, IBM Research Laboratory, Presider

1:30 PM Invited paper
TuAA1 Present Status and Future Trends in Erasable Optical Memories, Yoshito Tsunoda, Hitachi, Ltd., Japan. Erasable optical memories are a promising means for high density external and internal storage in future computer systems. Major technology trends are described.

2:05 PM
TuAA2 Erasable Digital Audio Disk System, Kenji Torazawa, Seiji Murata, Shigekazu Minechika, Yasuhiro Ishii, Sanyo Electric Co., Ltd., Japan. We have developed an erasable optical disk system for the PCM digital audio by using a magnetooptical disk. The constitution of the system is described.

2:25 PM
TuAA3 Magnetooptic Erasable Disk Memory with Two Optical Heads, Kozo Taira, Teruo Murakami, Katsutaro Ichihara, Masafumi Mori, Toshiba Corp., Japan. An MO erasable disk memory with two optical heads has been developed, the size being 146 x 203 x 82 mm. TbCo was used as the recording medium.

INTERNATIONAL BALLROOM WEST

2:45 PM-3:00 PM COFFEE BREAK

INTERNATIONAL BALLROOM WEST

MAGNETOOPTICS I
Robert A. Bartolini, RCA Laboratories, Presider

3:00 PM Invited paper
TuBB1 Recent Trends in Magnetooptical Disk Memory Systems, Noutaka Imamura, KDD Research and Development Laboratory, Japan.

3:30 PM
TuBB2 Magnetooptic Polarization Readout Model, David K. Campbell, David K. Towner, Hewlett-Packard Co. Polarization modeling of the readout signals for a magnetooptic recording system is used to compare differential and single detector readout, and to calculate the optical tolerances required for each.

3:50 PM
TuBB3 Characteristics of Magnetooptical Disks with Media Sandwiched between Protective Layers, Hidetsugu Kawabata, Kazumasa Yamamoto, Masahiro Biirakawa, Norio Miyatake, Toshio Shimizu, Masakazu Fukai, Matsushita Electric Industry Co., Ltd., Japan. Magnetooptical disks with media sandwiched between various protective layers are prepared. Recording sensitivity and lifetime of these disks are discussed.

4:10 PM
TuBB4 Magnetic Properties of CoGdTb Thin Films for Thermomagnetic/Magnetooptic Recording, D. K. Hairston, M. H. Kryder, Carnegie-Mellon U. Amorphous CoGdTb films have been characterized magnetically for use in thermomagnetic/magnetooptic recording. Increased coercivity resulted in films capable of supporting submicron domains.

INTERNATIONAL BALLROOM EAST

4:30 PM OSA AWARDS CEREMONY

EXHIBIT HALL

5:15PM-6:00PM REFRESHMENTS
WEDNESDAY, OCTOBER 16, 1985

CONCOURSE LEVEL LOBBY

8:00 AM-4:00 PM REGISTRATION

INTERNATIONAL BALLROOM WEST

MAGNETOOPTICS II
John C. Urbach, Xerox Palo Alto, Presider

8:30 AM Invited paper
WAA1 Magnetooptical Properties of Amorphous Magnetic Thin Films, Susumu Uchiyama, Nagoya U., Japan. This is a review of magnetic and magnetooptical studies on rare-earth transition metal amorphous alloy films performed in the past few years in Japan.

9:00 AM
WAA2 Highly Reliable TbCo Film for Erasable Optical Disk Memory, K. Ichihara, K. Taira, Y. Terashima, S. Shimanuki, N. Yasuda, Toshiba Corp., Japan. An erasable optical disk memory with high reliability has been developed using a TbCo medium. Very large $I_0 \times R \times \Theta_y$ products and sufficient sensitivity have been achieved by research on TbCo film composition and thickness.

9:20 AM
WAA3 Improvements in Corrosion Resistance of Tb-Fe Thin Films, M. Kobayashi, M. Asano, K. Kawamura, S. Ohno, Oki Electric Industry Co., Ltd., Japan. Electrochemical corrosion of Tb-Fe films was studied and the corrosion resistance was improved by adding several metals. Tl is the best inhibitor.

9:40 AM
WAA4 Effects of Wall Stiffness on Reproducibility of Thermomagnetically Written Domains, Han-Ping D. Shieh, Mark H. Kryder, Carnegie-Mellon U. The reproducibility of thermomagnetically written domains has been studied as a function of writing conditions and film parameters. A wall stiffness model is used to explain the experimental results.

10:00 AM
WAA5 Photoelastic Modulated Ellipsometry on Magneto-optic Multilayer Films, G. J. Sprokel, IBM Research Laboratory. A method is described to obtain the permittivity tensor of a magnetooptic layer in a multilayer film at arbitrary incident angle.

EXHIBIT HALL

10:20 AM-10:50 AM COFFEE BREAK

WEDNESDAY, OCTOBER 16, 1985—Continued

INTERNATIONAL BALLROOM WEST

ALTERNATIVE ERASABLE MEDIA
Di Chen, Optotech, Inc., Presider

10:50 AM Invited paper
WBB1 Performance of an Erasable Organic Dye-Binder Optical Disk Medium, Mool C. Gupta, Forrest Strome, Eastman Kodak Co. Results of diode laser recording on an erasable organic dye-binder optical disk medium are presented.

11:20 AM
WBB2 Voltage-Tunable Optical Data Storage using Persistent Spectral Hole Burning, U. Bogner, K. Beck, P. Schätz, Max Maier, U. Regensburg, F. R. Germany. Optical data storage by persistent spectral hole burning in the electric field and frequency domain has been investigated experimentally and by computer simulation.

11:40 AM
WBB3 Characterization of a Dyed-Polymer Optical Storage Medium, James E. Kuder, David E. Nikles, Celanese Research Co. The performance of a dyed-polymer optical storage medium is discussed in terms of the optical and physical properties of the recording layer material.

12:00 NOON LUNCH BREAK

INTERNATIONAL BALLROOM WEST

NONERASABLE SYSTEMS
Mark W. Goldberg, National Security Agency, Presider

1:30 PM Invited paper
WCC1 CD-ROM System, Yolchiro Sako, Tadao Suzuki, Sony Corp., Japan. The CD-ROM system, based on the audio compact-disk system, accommodates 840 times the data that can be recorded on a double-sided double-density 3.5-in. micro floppy disk.

2:20 PM
WCC3 Application Interface of WORM Optical Drives, J. R. Dulude, Optotech, Inc. This paper is an overview of the unusual nature of interfaces between a WORM optical disk drive, the controller, the host computer, and the application.
WEDNESDAY, OCTOBER 16, 1985—Continued

2:40 PM
WCC4 Integrating Write-Once Optical Disk as an Active Component in Mapping from Digitized Photographs, Erling Maartmann-Moe, Jens Bech Jorgensen, Norwegian Computing Center, Norway. Digital images are stored on an optical disk, a large-volume but relatively slow medium. Solutions for dynamic use of the images in digital photogrammetry are discussed.

EXHIBIT HALL

3:00 PM-3:30 PM COFFEE BREAK

INTERNATIONAL BALLROOM WEST

WRITE-ONCE MEDIA
Clark Kurtz, Eastman Kodak Company, Presider

3:30 PM
WDD1 Organic Dye Materials for an Optical Recording Medium, Hideaki Oba, Michiharu Abe, Masaakira Umehara, Tsutomu Sato, Yutaka Ueda, Makoto Kunikane, Ricoh Co., Ltd., Japan. A single layer type optical recording medium which utilizes cyanine dye material is developed. The dye exhibits metallic reflection. Read-write characteristics are described.

3:50 PM
WDD2 Optical Recording Disk using an Organic Dye Medium, Kunizoh Ogoshi, Fumio Matsui, Tsutomu Suzuki, Takeo Yamamoto, Pioneer Electronic Corp., Japan. An optical memory disk made of water-insoluble cyanine dye was developed. Recording and playback characteristics, reliability, and fabrication of the disk are presented.

4:10 PM
WDD3 Theoretical Modeling and Experimental Characterization of Drexon Recording Media, Edward V. LaBudde, Robert A. LaBudde, Robert Hazel, LaBudde Engineering Corp.; Terri Lichtenstein, Richard Haddock, Drexler Technology Corp. Optical and thermal models are developed for Drexon recording materials. Theoretical models are compared with experimental results from SEM, TEM, and recording equipment.

4:30 PM
WDD4 Plasmon Media Technology, Keith Gardner, Robert J. Longman, Robert M. Pettigrew, PA Technology, U.K.; Peter R. Helfet, Plasmon Data Systems, U.K. This paper describes the unique construction, recording mechanism, and characteristics of the plasmon ME media. Performance details, including sensitivity, carrier to noise ratio, and edge definition are given.

WEDNESDAY, OCTOBER 16, 1985—Continued

4:50 PM
WDD5 Volume Production of Plasmon ME Optical Disks, Keith Gardner, Robert J. Longman, PA Technology, U.K.; Peter R. Helfet, Plasmon Data Systems, U.K. The production details for manufacturing plasmon optical disks will be described. Areas to be covered include: photoresist processing, mastering, replication and testing. Results from the plasmon production unit at Cambridge will be presented.

5:10 PM BREAK

INTERNATIONAL BALLROOM CENTER

6:00 PM-7:45 PM CONFERENCE RECEPTION
THURSDAY, OCTOBER 17, 1985

CONCOURSE LEVEL LOBBY

8:00 AM-4:00 PM REGISTRATION

INTERNATIONAL BALLROOM WEST

SYSTEMS AND COMPONENTS
Gordon R. Knight, Optimem, Presider

8:30 AM Invited paper
ThAA1 Code Design for Optical Storage: a Comparison with Magnetic Storage, Paul H. Siegel, IBM Research Laboratory. Code designs for optical data storage are compared with those developed for high density digital magnetic recording.

9:00 AM
ThAA2 Optical Head for Magnetooptical Disk Evaluation, T. Fujita, M. Kondo, K. Kime, N. Tomikawa, N. Takeshita, Mitsubishi Electric Corp., Japan. Using a high-power semiconductor laser, we developed an optical head with a simple collimating system. The optical system and readout characteristics of the head are discussed.

9:20 AM
ThAA3 Use of Optical Fiber Heads for Optical Disks, Frank S. Barnes, K. S. Lee, U. Colorado; Archibald W. Smith, Storage Technology Corp. Single-mode optical fibers with photoresist lenses can deliver optical power to an optical disk for reading and writing. The advantages and disadvantages of such a system are discussed.

9:40 AM
ThAA4 GaAlAs Window Lasers with High cw Output Powers, J. Ungar, N. Bar-Chaim, I. Ury, Ortel Corp. We have fabricated GaAlAs large optical cavity-buried heterostructure window lasers. Single-transverse-mode operation and powers of 88 mW cw have been measured.

10:00 AM
ThAA5 Fast Access Actuator for Optical Disk Memory, Keiichi Yoshizumi, Syoji Goto, Hideaki Inoue, Ryochi Imamura, Matsushita Electric Industrial Co., Ltd., Japan. The new actuator is servo-driven locally and radially and gives an access time of 50 msec. Its movable component weighs only 12 grams.

EXHIBIT HALL

10:20 AM-10:50 AM COFFEE BREAK

THURSDAY, OCTOBER 17, 1985—Continued

INTERNATIONAL BALLROOM WEST

SERVO TECHNIQUES
Maarten R. deHaan, Optical Peripherals Laboratory, Presider

10:50 AM
ThBB1 New Focusing Method for DRAW-Type Optical Head, S. Arai, K. Hamada, K. Ogawa, Fujitsu Laboratories, Ltd., Japan. The focusing method we have developed—the wax-wane method—has the advantages of simplicity, easy optics adjustment, and high reliability. Principle and performance are described.

11:10 AM
ThBB2 Simulation of Radial Tracking Error Signals on Optical Disk Drives, Scott L. DeVore, Storage Technology Corp. The results of an optical disk radial tracking signal model based on diffraction are compared with a geometrical model and with experimental results.

11:30 AM
ThBB3 New Tracking Servo Technology, S. Arai, K. Hamada, K. Ogawa, Fujitsu Laboratories, Ltd., Japan. A simple tracking method which increases the track following range by adding electrical offset to the position signal of the tracking actuator is described.

11:50 AM
ThBB4 Composite Prewobbling Optical Disk Memory, Selji Yonezawa, Hitachi Central Research Laboratory, Japan. A new approach to the design of the optical track-following servo is described. The composite method combines using a track offset sampling technique to sense low-frequency tracking errors, with high-frequency tracking errors being sensed by the push-pull technique used in the pregroove format.

12:10 PM LUNCH BREAK

INTERNATIONAL BALLROOM WEST

DISK STANDARDS AND FABRICATION
Yoshito Tsunoda, Hitachi, Ltd., Presider

1:30 PM Invited paper
ThCC1 Standardization Activities for Optical Disks in Japan, Yoshinobu Mitsuhashi, Electro-Technical Laboratory, Japan. The standardization organizations and activities for optical disks in Japan are introduced. The results of the first ISO/TC 97/SC 23 Meeting in Tokyo are briefly introduced and discussed.
2:00 PM
ThCC2 Design Consideration of Optical Pregroove Dimensions, Manabu Yamamoto, Akinori Watabe, Hiroo Ukita, NTT Musashino Electrical Communication Laboratory, Japan. The relationship between pregroove dimensions and readout characteristics is described. The desirable pregroove dimensions needed to achieve stable data readout are discussed.

2:20 PM
ThCC3 Plastic Substrate for Optical Memory Disk, Yoshio Onisawa, Shinji Tokuhara, Taiji Hiramatsu, Hirotaka Toba, Daicel Chemical Industries, Ltd., Japan. A 30-cm diameter polycarbonate substrate of low birefringence was made by injection molding. The mechanism used for the deterioration of grooves of substrates is discussed.

2:40 PM
ThCC4 Thermosetting Resin Substrate for Computer-Use Optical Memory Disks, Shoji Ohsawa, Morio Tsuge, Akimitsu Takatsu, Toyoji Okunishi, Junji Tanaka, Shin-Ichi Mikami, Sumitomo Bakelite Co., Ltd., Japan. A thermosetting resin (epoxy resin) substrate for computer use with write-once, phase-change, and magnetooptical memory disks has been developed. Its typical properties are described and compared with other plastic substrates.

3:00 PM
ThCC5 Reduction of Media Noise in Optical Disks, M. Nakajima, M. Hamada, M. Moribe, H. Hirano, K. Itoh, S. Ogawa, Fujitsu Laboratories, Ltd., Japan. Substrate groove noise sources are identified and removed to improve the carrier-to-noise ratio of optical disks.

3:20 PM-3:50 PM COFFEE BREAK

INTERNATIONAL BALLROOM WEST

MEASUREMENTS AND MODELING
Robert P. Freese, 3M Company, Presider

3:50 PM
ThDD1 Generalized Mathematical Model of Noise Sources Affecting Optical Recording Processes, Edward V. LaBudde, Robert A. LaBudde, LaBudde Engineering Corp. The inherent noise processes for optical recording are modeled mathematically. Each noise component is identified and quantified separately. Methods are presented to identify particular noise sources from experimental data.

4:10 PM
ThDD2 Thermal Analysis of Thin Films under Pulsed Laser Irradiation, Sung-Chul Shin, Eastman Kodak Co. The 2-D thermal behavior of rare-earth transition metal films irradiated by a Gaussian laser beam is investigated using the finite element method.

4:30 PM
ThDD3 Measuring 2-D OTF Applying CT Principles, Xiang-Yang, Yang, Min-Shian Wu, Kuo-Fan Chin, Tsinghua U., China. A new method using the concept of the CT scanner has been developed to measure and evaluate a focused laser micro-spot.

4:50 PM
ThDD4 Development of Optical Disk Certifier Architecture, Stephen H. Stone, Earl Girbovan, ProQuip, Inc. The authors describe the methodology of testing optical digital data disks and the development of an improved tester architecture for performing reliable disk certification.

5:10 PM CLOSING REMARKS
Robert P. Freese, 3M Company, Program Cochair