

THE MAGNETIC RECORDING CONFERENCE

2005

TMRC

HEADS
and
SYSTEMS



TMRC 2005



ON

**HEADS
AND
SYSTEMS**

**16th Annual
Magnetic Recording Conference**

PROGRAM



August 15-17, 2005

Stanford University – Stanford, CA

TMRC 2005

Sponsored by the IEEE Magnetics Society and cosponsored by:
Data Storage Systems Center (DSSC)
Carnegie Mellon University

Center for Magnetic Recording Research (CMRR)
University of California, San Diego

Institute for Information Storage Technology (IIST)
Santa Clara University

Center for Micromagnetics & Information Technologies
(MINT) – University of Minnesota

Center for Materials for Information Technology (MINT)
University of Alabama

Center for Research on Information Storage Materials
(CRISM) – Stanford University

Computer Mechanics Laboratory (CML)
University of California, Berkeley

Steering Committee

Conference Chairman

Dr. Harry Gill
Hitachi Global Storage Technologies
5600 Cottle Road
San Jose, Ca 95193
Phone: 408-717-5568
Fax: 408-717-9130
Harry.gill@hitachiqst.com

Program Co-chairmen

Dr. Naoya Hasegawa
Alps, Electric Co., Ltd.
1-3-5, Higashi-Takami, Nagaoka,
Niigata, 940-8572, Japan
Phone: +81-258-24-4111
Fax: +81-258-24-4110
hasegawa@alps.co.jp

Dr. Rick Barndt
STMicroelectronics
4690 Executive Dr., Suite 200
San Diego, Ca 92121
Phone: 858-812-8353
Fax: 858-452-8202
Richard.barndt@st.com

Local Chairman
Prof. Shan Wang
Stanford University
Stanford, Ca 94305-4045
Phone: 650-723-8671
sxwang@ee.stanford.edu

Publications Chairman

Dr. Sining Mao
Seagate Technology (Ireland)
1 Disc Drive, Springtown Ind Est
Londonderry,
Northern Ireland BT48 0BF
Phone: 44 -28- 7127 4327
FAX: 44-28-7127 4440
Sining.mao@seagate.com

Publicity Chairman

Dr. Moris Dovek
Headway Technologies
678 S. Hillview Dr
Milpitas, CA 95035
Phone: 408-934-5625
Fax: 408-934-5400
Moris.dovek@headway.com

Treasurer

Dr. Joost Mortelmans
12388 Priscilla Ln
Los Altos, Ca 94022
Phone: 650-941-8035:
Fax: (650) 941-8035
mortelma@gmail.com

Poster Chairman

Dr. Sharat Batra
Seagate Technology
1251 Waterfront Place
Pittsburgh, PA, 15222-4215
Phone: 412-918-7051
sharat_batra@seagate.com

Dear Colleagues:

With utmost pleasure, I am announcing that this year's 16th annual TMRC will be held on the campus of the Stanford University on August 15 to 17, 2005. The main topics for the conference are Heads and Systems. This includes Read heads, Write heads, Perpendicular recording heads and systems, Recording systems, Advanced coding/detection and Reliability/Mechanics.

Naoya Hasegawa-san and Rick Barndt and their teams have put together an excellent program covering key technologies, which are at the forefront of the magnetic recording industry. With areal density growing roughly at the rate of 40% per year, key technologies to be presented at this conference: new generation of advanced GMR, Tunnel MR, CPP GMR, Perpendicular recording heads and systems, novel coding/detection schemes, and head reliability/Mechanics, will be playing key role in the near future.

We are really pleased about Stanford University hosting this conference. The oral sessions will be held at the Hewlett Teaching Center Auditorium and Stone Pine Plaza is to be used for Posters and Bierstube. I am sure you will find time to stroll through the pleasant Stanford campus. Historic Palo Alto Down Town will be a great place for dinner.

Finally, I would like to thank the entire team for untiring help throughout the past year and half to make this conference possible.

Harry Gill
Conference Chairman, TMRC 2005

Conference Location and Date:

TMRC 2005 will be held on August 15-17, 2005 at the Hewlett Teaching Center Auditorium and Stone Pine Plaza on the campus of Stanford University, Stanford, California.

The Leland Stanford Jr., University Campus where the conference will be held this year is home to a famous research university where teaching, learning and research are all integral. Current Stanford University faculty members have won 17 Nobel Prizes and 4 Pulitzer Prizes. Academic excellence crosses disciplines, ranging from humanities to social sciences to engineering and the sciences.

This all started in 1885 when Leland and Jane Stanford gave their Palo Alto Stock Farm to the university in the founding grant. The university opened its doors in 1891 to 500 young men and women. Today Stanford has approximately 14,000 students. Frederick Law Olmsted, the designer of New York's Central Park, conceived the general concept of the university grounds and buildings. The style called Richardsonian Romanesque is a blend of Romanesque and Mission Revival Architecture. More than 100 years later Stanford still enjoys 8180 acres of grassy fields, rolling hills as well as the Quadrangle at the center of the campus. On campus students and faculty can access new libraries, modern laboratories, and sports facilities as well as an extensive collection of art, such as sculptures by Auguste Rodin. Stanford is also home to a renowned medical center.

Accommodations:

While no formal arrangements have been made with any hotel, a list of nearby hotels is provided below for convenience:

- Sheraton: www.sheraton.com 650 328-2800 (625 El Camino Real, Palo Alto)
- Westin: www.starwoodhotels.com 650 321-4422 (675 El Camino Real, Palo Alto)
- Stanford Park: www.stanfordparkhotel.com 650 322-1234 (on El Camino Real about one mile north in Menlo Park)
- Crown Plaza Cabana: www.ichotelsgroup.com 650 857-0787 (4290 El Camino Real -- about 4 miles from campus)

Transportation and parking:

Stanford University is readily accessible by car and train. Interstate 280, and US Route 101 (Bayshore Freeway) all pass by just a short distance from campus. There are many other non-driving options also available for those attending the conference.

Public Transportation by train: CalTrain is a commuter rail service that runs between Gilroy and San Francisco. There are two stops close to Stanford: one on California Avenue and another at the end of Palm Drive in downtown Palo Alto. The Stanford Shuttle, called Marguerite, meets most trains at both the Palo Alto and California Ave. Stations from 6 a.m. to 7:45 p.m. Monday – Friday. http://transportation.stanford.edu/images/04-05_Transit-Map.pdf

From the East Bay (Dumbarton Express):

The Dumbarton Express, used by many East Bay commuters, runs weekdays from the Union City BART station across the Dumbarton Bridge to the Palo Alto CalTrain station, where the Stanford shuttle meets most trains.

Parking for Monday – Wednesday:

On-campus parking is located at the Galvez Field lot located at the corner of Galvez Street and Campus Drive East. The lot is within walking distance of the conference site. From Galvez Street walk to Serra Mall, turn right and walk past the Oval until you arrive to the Hewlett Teaching Center. Please refer to the maps at the end of the booklet.

Other options for on campus Stanford parking can be found in the URL below. Disabled parking passes are honored everywhere on campus.

http://transportation.stanford.edu/parking_info/VisitorParking.shtml

Registration Desk:

On site registration will also be available at Hewlett Teaching Center during the following hours:

Monday 7:30 AM – 2:00 PM

Tuesday 8:00 AM – 12 noon and 1:00 PM —2:00 PM

Wednesday 8:00 AM – 10:00 AM

Additional Local information:

The link below will take you to a page providing campus maps, travel directions, transportation links, and parking sites. <http://www-facilities.stanford.edu/maps/download.html#Parking-Map>

Included at the back of this booklet is a general campus map and a roadmap with travel directions to the University.

Information regarding disabled visitors available at:

http://transportation.stanford.edu/parking_info/DisabledInfo.shtml

Conference Registration:

Use the Conference Advance Registration form in the booklet. Payment in US dollars must be made by check (*drawn on a US bank only*), money order, or credit card (*VISA or MasterCard only*). Make checks payable to "TMRC 2005." Purchase orders will not be accepted. Registrations not accompanied by payment will only be processed as of the date of payment. Substitutions will be allowed at any time. Cancellations received prior to July 18th will be refunded, minus a \$25 administrative fee.

All conference attendees, including session chairs, speakers, and authors must pay registration fees. The registration fee includes admission to all technical and poster sessions, one copy of the digest booklet, daily continental breakfasts, and Bierstubes. In addition, attendees will receive a copy of the Magnetic Society Transactions within which the papers are published. On site registration will take place at the Hewlett Teaching Center. Please refer to the table below for hours of the registration desk. Banquet tickets are limited, so it is suggested that these be purchased in advance.

TMRC 2005 DAILY SCHEDULE

	Mon 15th	Tues 16th	Wed 17th
Registration	7:30 AM – 2 PM	8 – 12 AM & 1 – 2 PM	8 – 10 AM
7:45 - 8:30AM	Continental Breakfast	Continental Breakfast	Continental Breakfast
8:30AM – 12:00	Session A	Session C	Session E
12:00 – 1:30PM	Lunch Break	Lunch Break	Lunch Break
1:30 – 4:30PM	Session B	Session D	Session F
4:30 – 6:00PM	Posters	Posters	
6:00 – 9:00PM		Banquet	

All Oral Sessions: Hewlett Teaching Center Auditorium
Including Continental Breakfast

Poster/ Bierstube sessions: Stone Pine Plaza

TMRC Banquet, 6:00-9:00 PM, Clark Center LinX Café

Banquet Speaker: Dr. Mark Kryder, CTO, Seagate Technologies, "Magnetic Recording at Crossroads"

Last minute information may also be found at the TMRC Web site:
<http://tmrc.nanointernational.org>

Advance TMRC 2005 Registration Form

Please type or print. To receive the conference proceedings, please give a complete mailing address.

Last Name _____

First Name _____

Company _____

Address _____

City _____ State _____

Postal/Zip _____ Country _____

Phone (____) _____

Fax (____) _____

E-mail _____

Please indicate special arrangements or requests (i.e. disabled, etc)

IEEE Membership No. _____

Must be included for member's discount.

Registration Fee

IEEE Member @ \$260 \$ _____
(\$325 after July 18, 2005)

Non-Member @ \$315 \$ _____
(\$375 after July 18, 2005)

Full-time Student/Life member @ \$95 \$ _____

On site registration subject to \$40 surcharge \$ _____

Tuesday evening reception/banquet: @ \$50/person. Guests welcome.

Number tickets _____ Banquet payment \$ _____

TOTAL PAYMENT \$ _____

Visa/MasterCard # _____

Expiration Date (MM/YY) _____

Registration forms will only be processed if accompanied by payment!

- If paying by credit card, you may print and fax the completed registration form to (650) 941-8035.
- If paying by check, make it payable to "TMRC 2005" and mail with the completed registration form to:

TMRC 2005
12388 Priscilla Lane
Los Altos Hills, CA 94022-5116

Phone: (650) 941-8035 **Fax:** (650) 941-8035

Poster Sessions – Call for Papers

Poster sessions will be held Monday and Tuesday afternoons directly following the afternoon technical sessions. The poster sessions are a forum for presenting and discussing new and recent developments in the field of recording media. The poster sessions will be held in conjunction with the Bierstube at the Stone Pine Plaza, a short walk from the Hewlett Teaching Center Auditorium. Poster contributors must send a one page abstract to the Posters Chair by **July 15, 2005** for selection purposes. Please submit a description to sharat_batra@seagate.com

In addition, all invited speakers are also expected to prepare posters summarizing their oral presentations for the conference.

Display boards about 1.8 m wide by 1.2 m high will be provided for poster presentations. The title, authors, and affiliation should be prominently displayed. Include a sign-up sheet for reprint requests. Poster authors will have a set period when they must be at their posters; times will be staggered to allow discussions with other authors.

Contributed poster papers will not be published in the conference proceedings, but may be submitted for publication in the *IEEE Transactions on Magnetics* or other journals.

Student Travel Support

The IEEE Magnetics Society will award partial travel funding to help a few graduate students attend TMRC 2005 and present papers. To apply, the student should submit the following information: (1) Name, address, phone number, fax, and e-mail address of both the student and thesis advisor, and student's social security number; (2) a brief note of endorsement from the thesis advisor; (3) thesis title, brief description of the thesis work, expected graduation date; (4) title of student's proposed poster for TMRC 2005; (5) expected amount that student's institution will pay towards travel to TMRC 2005; (6) itemized budget for attending the conference (should include economy travel and accommodations); (7) list of conferences for which student has received prior travel support.

Please send this information to swang@ee.stanford.edu by **July 15, 2005**.

Visitor Information



The weather in the Silicon Valley/mid-Peninsula area for late August is generally sunny and mild. Daytime highs are in the high 70's and low 80s, with very low humidity, and nighttime low is around 60.

Once here, a large variety of activities are open to you, including world-class cultural arts, entertainment and night life, professional sports, theme parks, wineries (50 of Northern California's best!), shopping, and, of course, great hotels and restaurants.

Stanford attractions in the immediate vicinity include:

- Main Quad
- Memorial Church
- Hoover Tower
- Cantor Center for Visual Arts
- Rodin Garden

Additional Stanford University Information can be found at:

- <http://www.stanford.org>

Neighboring city of Palo Alto also offers many restaurants and shopping venues.

Other nearby attractions include:

- The Tech Museum of Innovation
- The Winchester Mystery House
- Paramount's Great America
- Santa Clara Mission
- Rosicrucian Egyptian Museum

The cities of Carmel, Monterey, San Francisco, and Santa Cruz, each with its unique attractions, are all less than one-hour's drive away.

We suggest that you visit the following web sites for more details about the location and its activities:

- www.santaclara.org
- www.sanjose.org
- www.monterey.org/visitorinfo.html
- www.scccvc.org
- www.sfvisitor.org
- www.city.palo-alto.ca.us

Session Agendas

Session A: Read Head Chair: Katsuya Mitsuoka, Hitachi		
Opening Remarks: Prof. Jim Plummer, Dean of Engineering, Stanford Univ.		
A1	A Performance Study of Next Generation's TMR Head with Advanced Design	T. Kagami, TDK
A2	Characteristics and Integration of TMR Heads for High Capacity Mobile Drives	Sining Mao, Seagate Recording Heads
A3	MgO Magnetic Tunnel Junctions with high TMR and Low Junction Resistance	K. Tsunekawa, Anelva Corp.
A4	Simulation and Measurement of Signals, Noise and SNR in GMR (CPP and CIP) and MTJ Heads	Xinzhi Xiing and Jack vanPeppen, Hitachi
A5	Narrow track width CPP spin-valve GMR heads utilizing half-metallicity materials	Masamichi Saito, Alps Electric Co.
A6	MR performance and nanoconstriction structure of CPP-GMR with current-confined-path NOL	H. Iwasaki, H. Fukuzawa, H. Yuasa, M. Takagishi, T. Funayama and K. Koi, Toshiba
Session B: Read Head /Write Head Chair: Moris Dovek, Headway		
B1	Contribution of spin torque in CPP head noise	Mark Covington, Seagate Research
B2	Mag noise and spin torque in CPP Sensor	Neil Smith, Hitachi
B3	Enhanced GMR Ratio of Dual-SV with Monolayer Pinned Structure	Koji Shimazawa, TDK
B4	Relationship between head design, pole-tip magnetization, head field, and media magnetization in longitudinal recording	Kenichi Takano, Headway
B5	Different Aspects of Electrodeposition of 2.4 T CoFe Alloys at Nanoscale for Magnetic Recording Applications	Stanko Bronkovic, Seagate
B6	Enhancement of magnetic flux density in sputtered FeCoPd alloy and [FeCo/Pd] _n super-lattice films at room temperature	K. Noma, M. Matsuoka, H. Kanai and Y. Uehara, Fujitsu

Session Agendas

Session C: Perpendicular Recording Chair: Dmitri Litvinov, University of Houston		
C1	Head challenges for Perpendicular recording at high areal density	Ching Tsang, Hitachi
C2	Reverse Overwrite Processes in Perpendicular Recording	Shaoping Li, Seagate
C3	Media saturation and Overwrite in Perpendicular Recording	Alex Taratorin, Hitachi
C4	Overwrite Mechanism in Perpendicular Recording	Jimmy Zhu and Yuchen Zhou, CMU
C5	Write Field measurements of a Perpendicular head on a soft underlayer film	Nils Gokemeijuer, Seagate
C6	Direct Measurement of Magneto-Dynamics in Perpendicular recording system	Juergen Heidmann, Hoa Do, Min Xiao, Kentaro Takano, Yoshihiro Ikeda, Hitachi
Session D: Recording Systems Chair: Tom Howell, San Jose State Univ.		
D1	Perpendicular Drive Integration	Akihiko Takeo and Yoichiro Tanaka, Toshiba
D2	Perpendicular Drive Integration	Davide Guarisco, Maxtor
D3	Channel Characterization Methods using Dipulse Extraction	Walt Eppler, Seagate
D4	Recording Over 15ktpi using Multi-Channel Heads in a Tape Systems	Shinichi Fukuda, Sony
D5	Drive-Independent Data Recovery: The Current State-of-the-Art	Charles Sobey, Channel Science
D6	Modeling of timing error process from spinstand measurements	Alek Kavcic, Harvard Univ.

Session Agendas

NOTES

Session E: Advanced Coding, Detection, and ECC Chair: Marcus Marrow, Link A Media Devices		
E1	New Coding Techniques for Magnetic Recording Systems	Hideki Sawaguchi, Hitachi
E2	Iterative Decoding and structured LDPC Codes	A. Kuznetsov, Seagate
E3	Structured LDPC codes with large girth	Moura / Lu, CMU
E4	Tensor Product Parity Codes	Panu Chaichanavong, CMRR
E5	The Combined Constraints	Demirkan / Lee, Hitachi
E6	Iterative decoder in FPGA	Lingyan Sun, CMU
Session F: Reliability and Mechanics Chair: David Bogy, UC Berkeley		
F1	Reliability of Tunneling MR Recording Head – Lifetime, Failure Mode and Production Screening	Pak Kin Wong, SAE
F2	GMR ESD Damage by a Surrounding Trigger	Zhao-Yu Teng, SAE
F3	HDI Design Options for Proximity Recording Hard Disk Drives	David Bogy, Vineet Gupta, Du Chen and Jia-Yang Juang, UC Berkeley
F4	Dynamic Modeling and control of micro-actuators	Raymond de Callafon, CMRR
F5	Demonstration of more than 1,000 G external shock resistance during R/W operation in 0.85 inch HDD with balanced type suspension	Hideki Kuwajima, Matsushita Electric Industrial Company
F6	Head Pre-amp interconnects	John D. Pro, Hutchinson

If you are coming from U.S. Highway 101:

- Take the Embarcadero Road Exit to Palo Alto and follow Embarcadero through Palo Alto to Stanford
- At El Camino Real, Embarcadero turns into Galvez Street at the border of the university
- Continuing in the left lane of Galvez Street proceed to the junction of Campus Drive East
- If you are parking at the Galvez Lot, it is located to the right at the corner of Campus Drive East and Galvez Street.

If you are coming from Interstate 280:

- Driving 280 heading south, exit at Arastradero Rd/Page Mill Rd. Go left onto Page Mill Road and proceed under 280.
- Driving 280 heading north, exit at Page Mill Road towards Palo Alto.
- At the second set of lights, turn left onto Foothill Expwy which becomes Junipero Serra Blvd.
- Turn right at Campus Drive East and follow it through campus.
- If you are parking at the Galvez Lot, it is located to the right at the corner of Campus Drive East and Galvez Street.

Walking from Galvez parking lot to the Conference Site:

- Follow Galvez Street towards the Serra Mall
- Turn right onto Serra Mall and walk past the Oval until you arrive at the Hewlett Teaching Center

Campus Map

