TMRC 2005

ON

HEADS
AND
SYSTEMS

16th Annual
Magnetic Recording Conference

PROGRAM

August 15-17, 2005

Stanford University – Stanford, CA
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.

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

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

http://www.facilities.stanford.edu/maps/download.html#Parking-Map

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.

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. ________________________

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: (850) 941-8035      Fax: (850) 941-8035

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**

<table>
<thead>
<tr>
<th></th>
<th>Mon 15th</th>
<th>Tues 16th</th>
<th>Wed 17th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration</td>
<td>7:30 AM – 2 PM</td>
<td>8 – 12 AM &amp;</td>
<td>8 – 10 AM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – 2 PM</td>
<td></td>
</tr>
<tr>
<td>7:45 - 8:30AM</td>
<td>Continental</td>
<td>Continental</td>
<td>Continental</td>
</tr>
<tr>
<td></td>
<td>Breakfast</td>
<td>Breakfast</td>
<td>Breakfast</td>
</tr>
<tr>
<td>8:30AM – 12:00</td>
<td>Session A</td>
<td>Session C</td>
<td>Session E</td>
</tr>
<tr>
<td>12:00 – 1:30PM</td>
<td>Lunch Break</td>
<td>Lunch Break</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>1:30 – 4:30PM</td>
<td>Session B</td>
<td>Session D</td>
<td>Session F</td>
</tr>
<tr>
<td>4:30 – 6:00PM</td>
<td>Posters</td>
<td>Posters</td>
<td></td>
</tr>
<tr>
<td>6:00 – 9:00PM</td>
<td>Banquet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
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 sxwang@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.

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.

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.scccvcc.org
- www.sfvisitor.org
- www.city.palo-alto.ca.us
## Session A: Read Head
**Chair:** Katsuya Mitsuoka, Hitachi

<table>
<thead>
<tr>
<th>Session A: Read Head</th>
<th>A1</th>
<th>A Performance Study of Next Generation’s TMR Head with Advanced Design</th>
<th>T. Kagami, TDK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A2</td>
<td>Characteristics and Integration of TMR Heads for High Capacity Mobile Drives</td>
<td>Sining Mao, Seagate Recording Heads</td>
</tr>
<tr>
<td></td>
<td>A3</td>
<td>MgO Magnetic Tunnel Junctions with high TMR and Low Junction Resistance</td>
<td>K. Tsunekawa, Anelva Corp.</td>
</tr>
<tr>
<td></td>
<td>A4</td>
<td>Simulation and Measurement of Signals, Noise and SNR in GMR (CPP and CIP) and MTJ Heads</td>
<td>Xinzhi Xing and Jack vanPeppen, Hitachi</td>
</tr>
<tr>
<td></td>
<td>A5</td>
<td>Narrow track width CPP spin-valve GMR heads utilizing half-metallicity materials</td>
<td>Masamichi Saito, Alps Electric Co.</td>
</tr>
</tbody>
</table>

## Session B: Read Head / Write Head
**Chair:** Moris Dovek, Headway

<table>
<thead>
<tr>
<th>Session B: Read Head / Write Head</th>
<th>B1</th>
<th>Contribution of spin torque in CPP head noise</th>
<th>Mark Covington, Seagate Research</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B2</td>
<td>Mag noise and spin torque in CPP Sensor</td>
<td>Neil Smith, Hitachi</td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>Enhanced GMR Ratio of Dual-SV with Monolayer Pinned Structure</td>
<td>Koji Shimazawa, TDK</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>Relationship between head design, pole-tip magnetization, head field, and media magnetization in longitudinal recording</td>
<td>Kenichi Takano, Headway</td>
</tr>
<tr>
<td></td>
<td>B5</td>
<td>Different Aspects of Electrodeposition of 2.4 T CoFe Alloys at Nanoscale for Magnetic Recording Applications</td>
<td>Stanko Bronkovic, Seagate</td>
</tr>
<tr>
<td></td>
<td>B6</td>
<td>Enhancement of magnetic flux density in sputtered FeCoPd alloy and [FeCo/Pd]n super-lattice films at room temperature</td>
<td>K. Noma, M. Matsuoka, H. Kanai and Y. Uehara, Fujitsu</td>
</tr>
</tbody>
</table>

## Session C: Perpendicular Recording
**Chair:** Dmitri Litvinov, University of Houston

<table>
<thead>
<tr>
<th>Session C: Perpendicular Recording</th>
<th>C1</th>
<th>Head challenges for Perpendicular recording at high areal density</th>
<th>Ching Tsang, Hitachi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C2</td>
<td>Reverse Overwrite Processes in Perpendicular Recording</td>
<td>Shaoping Li, Seagate</td>
</tr>
<tr>
<td></td>
<td>C3</td>
<td>Media saturation and Overwrite in Perpendicular Recording</td>
<td>Alex Taratorin, Hitachi</td>
</tr>
<tr>
<td></td>
<td>C4</td>
<td>Overwrite Mechanism in Perpendicular Recording</td>
<td>Jimmy Zhu and Yuchen Zhou, CMU</td>
</tr>
<tr>
<td></td>
<td>C5</td>
<td>Write Field measurements of a Perpendicular head on a soft underlayer film</td>
<td>Nils Gokemeijuer, Seagate</td>
</tr>
<tr>
<td></td>
<td>C6</td>
<td>Direct Measurement of Magneto-Dynamics in Perpendicular recording system</td>
<td>Juergen Heidmann, Hoa Do, Min Xiao, Kentaro Takano, Yoshihiro Ikeda, Hitachi</td>
</tr>
</tbody>
</table>

## Session D: Recording Systems
**Chair:** Tom Howell, San Jose State Univ.

<table>
<thead>
<tr>
<th>Session D: Recording Systems</th>
<th>D1</th>
<th>Perpendicular Drive Integration</th>
<th>Akihiko Takeo and Yoichiro Tanaka, Toshiba</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D2</td>
<td>Perpendicular Drive Integration</td>
<td>Davide Guarisco, Maxtor</td>
</tr>
<tr>
<td></td>
<td>D3</td>
<td>Channel Characterization Methods using Dipulse Extraction</td>
<td>Walt Eppler, Seagate</td>
</tr>
<tr>
<td></td>
<td>D4</td>
<td>Recording Over 15ktpi using Multi-Channel Heads in a Tape Systems</td>
<td>Shinichi Fukuda, Sony</td>
</tr>
<tr>
<td></td>
<td>D5</td>
<td>Drive-Independent Data Recovery: The Current State-of-the-Art</td>
<td>Charles Sobey, Channel Science</td>
</tr>
<tr>
<td></td>
<td>D6</td>
<td>Modeling of timing error process from spinstand measurements</td>
<td>Alek Kavcic, Harvard Univ.</td>
</tr>
</tbody>
</table>
### Session Agendas

#### Session E: Advanced Coding, Detection, and ECC

**Chair:** Marcus Marrow, Link A Media Devices

<table>
<thead>
<tr>
<th>Session E:</th>
<th>New Coding Techniques for Magnetic Recording Systems</th>
<th>Hideki Sawaguchi, Hitachi</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Iterative Decoding and structured LDPC Codes</td>
<td>A. Kuznetzov, Seagate</td>
</tr>
<tr>
<td>E2</td>
<td>Structured LDPC codes with large girth</td>
<td>Moura / Lu, CMU</td>
</tr>
<tr>
<td>E3</td>
<td>Tensor Product Parity Codes</td>
<td>Panu Chaichanavong, CMRR</td>
</tr>
<tr>
<td>E4</td>
<td>The Combined Constraints</td>
<td>Demirkan / Lee, Hitachi</td>
</tr>
<tr>
<td>E5</td>
<td>Iterative decoder in FPGA</td>
<td>Lingyan Sun, CMU</td>
</tr>
<tr>
<td>E6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Session F: Reliability and Mechanics

**Chair:** David Bogy, UC Berkeley

<table>
<thead>
<tr>
<th>Session F:</th>
<th>Reliability of Tunneling MR Recording Head – Lifetime, Failure Mode and Production Screening</th>
<th>Pak Kin Wong, SAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>GMR ESD Damage by a Surrounding Trigger</td>
<td>Zhao-Yu Teng, SAE</td>
</tr>
<tr>
<td>F2</td>
<td>HDI Design Options for Proximity Recording Hard Disk Drives</td>
<td>David Bogy, Vineet Gupta, Du Chen and Jia-Yang Juang, UC Berkeley</td>
</tr>
<tr>
<td>F3</td>
<td>Dynamic Modeling and control of micro-actuators</td>
<td>Raymond de Callafon, CMRR</td>
</tr>
<tr>
<td>F4</td>
<td>Demonstration of more than 1,000 G external shock resistance during R/W operation in 0.85 inch HDD with balanced type suspension</td>
<td>Hideki Kuwajima, Matsushita Electric Industrial Company</td>
</tr>
<tr>
<td>F5</td>
<td>Head Pre-amp interconnects</td>
<td>John D. Pro, Hutchinson</td>
</tr>
</tbody>
</table>
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.