

# IDEMA<sup>®</sup>



## **“Facing the Challenges through Innovation”**

*Thursday & Friday (1.5 days)  
March 12 & 13, 2009*



**Orchid Country Club, Singapore**  
*(Grand Ballroom, Social Clubhouse)*  
1 Orchid Club Road, Singapore 769162  
Tel: +65 6755 9811

**Co-Organizer:**



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The logo for MMi, featuring the letters 'MMi' in a bold, blue, sans-serif font. The 'i' has a dot.The logo for SEKSUN, featuring a stylized graphic of a green and blue swoosh with an orange dot, followed by the word 'SEKSUN' in a bold, blue, sans-serif font.The logo for TSL, featuring the letters 'TSL' in a bold, white, sans-serif font inside a blue, stylized diamond shape. To the right of the diamond is the text 'TRUST. SCIENCE. INNOVATION.' in a smaller, blue, sans-serif font.The logo for GORE, featuring the word 'GORE' in a bold, black, sans-serif font inside a black rectangular box. A red arrow points from the right side of the box. Below the box is the text 'Creative Technologies Worldwide' in a smaller, black, sans-serif font.

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The Global Trade Association for the Disk Drive Industry

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Singapore, 12 & 13 March 2009

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## **“Facing the Challenges through Innovation”**

“Suppliers of HDDs, SSDs, and contributing technologies face their most daunting challenges in more than 20 years. Global economic problems are depressing demand and forcing prices down, but companies are forced to maintain investment, reduce cost – and to INNOVATE to meet these challenges. Innovation arising from new technology introduction has, in the past, contributed to the growth of storage by providing lower prices per gigabytes at progressively increasing capacities, improved performances and reliability. DISKCON Asia-Pacific 2009 will investigate storage in the present environment, addressing both HDD and SSD technologies and how innovations, as increased areal densities using new structures and narrower line widths using advanced equipment, will sustain industry growth.”

# DATA STORAGE INSTITUTE



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The Data Storage Institute (DSI) is a member of the Agency for Science, Technology and Research (A\*STAR). Established in 1992 as the Magnetics Technology Centre (MTC), it was renamed Data Storage Institute in 1996. The research institute's vision is to be a vital node in a global community of knowledge generation and innovation, nurturing research talents and capabilities for world-class R&D in next generation storage technologies. DSI is a member of the non-profit Information Storage Industry Consortium (INSIC) of USA.



# DYMEK ASIA (S) PTE LTD/ n&k TECHNOLOGY

**DYMEK**  
DYMEK ASIA (S) PTE LTD



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Dymek Asia (S) Pte Ltd is an advanced equipment distributor to Data Storage, Semi-Conductor, Optical industries as well as the R&D sector. Headquartered in Hong Kong, Dymek has been expanding its local presence in various regions and now has 9 branch offices operating in China, Taiwan and South East Asia. Our aim is to cope with the fast growing business and provide immediate sales & technical support to our customers.

N&k Technology's fully automated metrology system, the n&k Gemini, and the cost-effective manual load n&k 1900-CDRT, provide non-destructive and accurate measurements of both Templates, DTR and BPM Media, that include: Depth, Top and Bottom CDs, Residual Layer Thickness, Side Wall Angles. Complete uniformity maps of these parameters are furnished. Measurements of disks with pitches of 50nm or less are possible.



# ENTEGRIS



**Company Name** : **Entegris Singapore Pte. Ltd.**

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Entegris, Inc. is a leading provider of products, materials and systems that purify, protect and transport critical materials used in the manufacturing of electronics and high-technology products. These solutions include: wafer carriers and shippers that protect semiconductor wafers and solar cells from contamination and breakage; filtration products that purify process gases and fluids, as well as the ambient environment; liquid systems and components that dispense, control or transport process fluids; specialty coatings that provide high purity surfaces for wear-resistance, corrosion protection and smoothness; premium graphite materials for high performance applications; and shippers and trays for protecting and transporting disk drive components. Entegris primarily sells direct to its customers, which include virtually every maker of semiconductors, flat panel displays and data storage devices as well as suppliers of fabrication equipment, wafers, substrates and high-technology products.

Entegris Singapore Pte. Ltd. south east Asia sales office provide products and services for applications across key data storage manufacturing processes to help hard disk drive (HDD) makers solve contamination challenges, enhance yield and gain sustainable competitive advantage.



# INTEVAC



**Company Name** : **Intevac, Inc.**

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Intevac, Inc. is the market leader in thin film deposition technology (PVD, CVD, Lube) for the hard disk drive industry. The patented Intevac 200 Lean® Gen II is Intevac's next generation disk sputtering system. The 200 Lean Gen II provides higher throughput from a smaller footprint, which enables more magnetic disks to be manufactured per square-foot of factory floor space. The 200 Lean Gen II provides significant improvements in defect reductions and yield improvements. The goal is to reduce overall cost of ownership for our customers. The flexible and modular design of the 200 Lean Gen II accommodates the production of multiple disk sizes, both aluminum and glass disks, and the growing number of thin-film process steps required for advanced technologies such as perpendicular recording.



# LIGHTHOUSE



**Company Name** : **Lighthouse Worldwide Solutions**

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Lighthouse Worldwide Solutions is the world's leading supplier of real time contamination monitoring Systems. Lighthouse has leveraged its superior software design, data integration ability and worldwide support offices to provide its customers with leading edge contamination monitoring solutions. The Lighthouse Monitoring System has become the standard for many companies, such as Seagate, Western Digital, TSMC, Hewlett Packard, Hitachi, Boeing, Maxtor, Micron, Abgenix, Medtronic, Fujitsu and many more.

Lighthouse has developed the industry's most advanced particle counters for air, liquid and gas and manufactures a complete line of handheld, portable and remote particle counters.

Lighthouse is the first company to develop an Open Architecture system providing its customers the flexibility they need to integrate all types of sensors into one monitoring system.

Lighthouse offers many other monitoring instruments for Electrostatic Charge, Airborne Molecular Contamination and Ultra Pure Water Monitoring. Lighthouse Particle Counters lead the industry in terms of quality, accuracy and technology.



# MOLECULAR IMPRINTS, INC



**Company Name** : **Molecular Imprints**

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Molecular Imprints, Inc. (MII) is the technology leader for high-resolution, low cost-of-ownership nanopatterning systems and solutions in the hard disk drive (HDD) and semiconductor industries.

MII is leveraging its innovative Step and Flash Imprint Lithography (S-FIL<sup>®</sup>) with Drop-on-Demand<sup>™</sup> material application technology to become the worldwide market and technology leader in high-volume patterning solutions for storage and memory devices, while enabling emerging markets in optics, biotechnology, and other industries.

MII enables nanoscale patterning by delivering a comprehensive nanopatterning solution that is affordable, compatible and extendible to sub-10-nanometer resolution levels.



# PARK SYSTEMS



**Company Name** : **Park Systems Corporation**  
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**Park Systems is the Nanotechnology Solutions Partner for Hard Disk Drive Industry.**

Park System serves the hard disk drive (HDD) industry with automated nanotechnology measurement solutions including atomic force metrology tools, software, and global service and support. Partnering with world leaders in HDD industry, Park Systems has been successfully delivering optimized solutions for the most challenging imaging and measurement needs in the industry.



# RAYCO TECHNOLOGIES



**Company Name** : **Rayco Technologies**

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Founded in 1954, Rayco Technologies is an innovative Precision Elastomeric Solutions Specialist, creating precision components that are used in the Data Storage, Medical Devices, Lifestyle, Electronics, Automotive and Aerospace industries.

From Design to Delivery, Rayco believes in early involvement with their customers. Its Elastomeric Technology Center develops unique Elastomeric compounds for mission critical applications and their design center engages partners from concept, to product design and quick prototyping of precision components.

Its capabilities include Dispense-In-Place-Gasketing, Liquid Injection Compression, and Transfer & Insert Molding. They are also able to over mold a variety of elastomers with substrates such as plastic and metal as well as the application of coatings.

Its manufacturing facilities in both Singapore and China are ISO/TS16949 & ISO 9001:9002 certified. They are also equipped with Class 100 clean room production environments and an ISO/IEC 17025 accredited laboratory that conducts chemical, mechanical and analytical test services.



# TSI



TRUST. SCIENCE. INNOVATION.

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TSI Incorporated is an industry leader focused on the design and production of over 200 precision measurement instruments that serve the contamination control, particle research, chemical analysis, fluid mechanics research and occupational health & safety market places.

TSI AEROTRAK Remote Particle Counters offer the most features and flexibility out of any remote particle counter on the market today. Integration is easy using Ethernet (TCP/IP) or Serial Modbus TRU communications. These instruments can be powered over its Ethernet connection (Power-over-Ethernet) simplifying installation. Configuration can be done locally with a PC or remotely via a web interface.

TSI AEROTRAK Handheld Particle Counters are for customers interested in low cost and versatile particle contamination monitoring.

TSI AEROTRAK Portable Particle Counters are for customers interested in manually monitoring particle contamination at high flow rates. These particle counters can be used as stand-alone portable counters or can be integrated into a facility monitoring system.



# VEECO ASIA PTE LTD



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Veeco provides the only complete suite of process equipment and metrology tools that provide an integrated solution from wafer to HGA. From NEXUS etch and deposition products for the creation of the reader and writer stacks, to Aii lapping, slicing and dicing products that offer repeatability to 3nm to optical magnetic, and atomic force microscopy metrology and test equipment, Veeco offers more tools for data storage than any other manufacturer.



# WESTECH ELECTRONICS LIMITED



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## **Product Exhibit**

Flexstar Technology is the world's leading manufacturer and supplier of ambient, burn-in, environmental and high altitude test systems for the data storage industries.

Flexstar's mission is to provide storage manufacturers and their customers with standardized and repeatable testing and qualification processes.

To accomplish this mission, Flexstar provides several open architecture test solutions for design validation, quality and reliability, compliance and compatibility, RMA and production applications. With an extensive product variety that ranges from simple components to turnkey systems, Flexstar has provided solutions to many leading hard disk drive manufacturers and OEMs.

Through experiences accumulated from their wide customer base and their ability to complement customers' internal testing efforts, these have allowed Flexstar to tailor their solutions to meet customer's specific requirements.

Flexstar's success is mainly attributed to their ability to consistently develop test solutions in the face of a demanding industry, where technological and market forces continuously push expectations on performance of customers' products upwards.

Being committed towards providing excellent service to their customers, Flexstar Technology enables their customers to provide value through their data storage systems in the Internet era.



## **Speakers' Biographies**

### **Steven Liu, General Manager (Taipei & Shanghai), Hitachi Global Storage Technologies**

Steven Liu is General Manager in Taiwan and Shanghai region for Hitachi Global Storage Technologies. In this role, Mr. Liu is mainly responsible for driving hard disk drive business growth in Taiwan and Shanghai. He also manages the client service and support and other business regarding to OEMs, ODMs, consumer electronics application and distributors.

Mr. Liu has accumulated 8-year experience in the storage industry. He joined IBM as sales in the storage technology department and successfully increased the revenue of IBM's hard disk drive business. When Hitachi Global Storage Technologies was founded in 2003, a result of the strategic combination of IBM and Hitachi's storage technology businesses, he transferred to Hitachi GST and was appointed as General Manager in Shanghai region in July 2004.

Mr. Liu excels at business management and marketing. He assumed a key role at Hitachi GST as General Manager in Taiwan and Shanghai region in 2006, responsible for Hitachi GST's hard disk drive business growth in both regions. Prior to his successful career at IBM and Hitachi GST, he worked for Wafer Tech as Process Integrated Engineer, accumulating experience related to process management.

Steven Liu holds a Master of Sciences degree in Electrical Engineering from University of Southern California and a Bachelor of Sciences degree in Electrophysics from National Chiao Tung University.

### **Mark Geenen, President, TrendFOCUS**

**Mark Geenen** is the President and Founder of TrendFOCUS, one of the leading providers of data storage market intelligence. With over 20 years in the disk drive industry, Mr. Geenen and his team have developed a global data-gathering strategy that delivers to customers innovative, forward-looking analyses on demand for hard drives, component technology trends, and effects on the storage ecosystem. He is frequently cited in many publications, such as the Wall Street Journal, Forbes, San Francisco Chronicle, and EE Times.

### **Matthew Bryson, Managing Director, Avian Securities**

**Matthew Bryson** has been responsible for covering the Storage industry including Hard Drives since 2001 when he joined Avian Securities, a Boston based investment research boutique specializing in technology. He was influential in developing Avian's bottom up analysis of distribution channel trends, which underlies the company's work in the PC component space. In his own storage coverage, he augments this work with information from the extensive network of industry contacts he has developed during his tenure at Avian. Prior to Avian, Matthew held a Research Analyst position at Charles River Associates, a Boston based economic consulting firm where he first honed his skills in financial modeling and company analysis working with the metals & minerals team.

Matthew graduated Cum Laude with Honors from Williams with Bachelor's Degrees in Economics and History.

### **Dr. Tom Coughlin, President, Coughlin Associates**

**Dr. Coughlin** is the Founder and President of Coughlin Associates. Tom has over 30 years of experience in the data storage industry as a working engineer and high level technical manager. In addition to regular technical and management consulting projects he is the publisher of reports on digital storage in consumer electronics as well as content creation and distribution. He is the author of the recently published Digital Storage in Consumer Electronics:

## Speakers' Biographies

Cont...

The Essential Guide from Newnes (a division of Elsevier). Tom has many published articles on digital storage and its applications. He has 6 patents on magnetic recording and related technologies.

Tom is the founder and organizer of the annual Storage Visions Conference, a partner to the International CES as well as the Creative Storage Conference which was a partner of the 2008 National Association of Broadcasters show. Tom is a senior member of the IEEE and in 2007 chairman of the Santa Clara Valley IEEE Section and San Francisco Bay Area Council and was chairman of the Santa Clara Valley IEEE Consumer Electronics Society in 2006 and past chairman of the SCV IEEE Magnetics Society more than once. He is currently chairman of the Region 6 Central Area of the IEEE. Tom is a member of the IEEE CE Society Administrative Committee. He is also a member of APS, AVS, IDEMA, SNIA, AAAS, TCG and SMPTE.

### **Dr. Ed Grochowski, Storage Consultant**

**Dr. Ed Grochowski** is a well known speaker on storage technology. He began his career with IBM's microelectronic silicon activity in New York and later joined the IBM Almaden Research Center where his interests included hard disk drive and component evolutionary trends. Dr. Grochowski holds nine patents and has authored and presented numerous articles on magnetic disk drives and component technology, including a website of storage trend charts.

He has a Ph.D. from New York University in Chemical/Materials Engineering. Ed served as Executive Director of IDEMA USA and for over ten years has chaired the conferences and technical committees for DISKCON USA and DISKCON AP, as well as the prestigious IDEMA Symposium series. Ed currently supports IDEMA as the Conference Chairman and Director for DISKCON as well as for the IDEMA Symposium series. He is a long time coordinator of the 4K byte sector standards committee for IDEMA and continues to advise this group. Ed is also a member of the IEEE.

As a consultant, Dr. Grochowski has been associated with Hitachi GST, IDC, TrendFocus and Coughlin Associates.

### **Henry Patland, President & CEO, Integral Solutions International**

**Henry Patland** has 20 years experience in the Data Storage industry in the Test Equipment design area.

In 1995 Henry co-founded Integral Solutions International, which is the leading Quasi-Static Test Equipment manufacturer. Since its inception Henry has been the President & CEO of ISI, which is one of the fastest growing companies in the disk drive test equipment area. He is a prominent figure in the development and standardization of head tests commonly utilized in the data storage industry. ISI has equipment installed at every major Drive and Head manufacturing facility.

In 1994 Henry worked at Akashic Memories as the lead Software Architect for the new Media Certifier jointly developed with Hewlett-Packard.

Prior to that Henry had worked at Guzik Technical for 6 years as Software/Test Engineer and was involved in many projects including Dynamic Head Tester, Flying Height Tester, Media Certifier, and other projects.

Henry received a BS degree from U.C. Santa Cruz in 1988 with major in Computer Engineering and minor in Mathematics. Henry has been awarded 2 patents, with 6 others pending, in the area of testing of Magnetic Heads.

## Speakers' Biographies

Cont...

### **Dr. Tony Lavia, President & CEO, Flexstar Technology**

**Dr. Tony Lavia** has over 25 years of experience in the high technology and telecommunications industry. He has served in executive positions with public companies and has been CEO of several startup companies, in the U.S., Canada, and Europe. At present he is the President and CEO of Flexstar Technology, a private company that leads in the development of QA test systems for the storage industry.

Tony recently launched a company to develop telecom services for underdeveloped countries such as Vietnam, using the latest wireless and converged technologies. Up until June of 2005, he had been at Symmetricom in San Jose, California, where he served as the Executive Vice President and General Manager of the Broadband Network Division and as the Chief Technology Officer of the Company. There, he successfully incubated a new business venture in the broadband access space; established distribution and vendor partnerships, and launched a new break-out business for Symmetricom.

From 1999 to 2000 he was the Chairman, President and CEO of Zaffire, a startup company in "Silicon Valley" developing advanced DWDM-based photonic systems for metropolitan core carrier networks. Prior to this he served as President and CEO of Ironbridge Networks, a startup company in Boston's "128 corridor" dedicated to developing terabit-level core-network routers.

From 1994 to 1998 Tony worked in the GM capacity at Nortel and Newbridge. As VP and GM he led the ATMnet business at Newbridge Networks into the number one market position for ATM switches. As VP and GM of broadband switching at Northern Telecom he positioned Nortel in the broadband switching sector and forged the partnership with Fore Systems. Tony had a variety of senior P&L positions in Bell Canada, where he took a turn as the GM of all of the then operational divisions, including Business Networks, Enterprise Data/Network Equipment, and the Consumer Division.

In addition, Tony worked in Canada at the Bell Northern Research labs, in Germany as a consultant to Deutsche Telekom, and as a lecturer in Computer Science at the University of Auckland, New Zealand.

Tony holds a Master and Ph.D. in Computer Sciences from the University of Waterloo, and an Honors B.Sc. in Applied Mathematics and Theoretical Physics from McMaster University.

### **Manoj Vaddineni, Country Manager – India, Finisar Corporation**

**Manoj Vaddineni** is the Country Manager for Finisar in India; mostly working with companies in Storage space from Chip all the way to Systems. Moved from Engineering into Product Marketing and then from Product Marketing into Sales. Most of the experience is in Storage space.

Manoj defined and delivered the first SAS\SATA compliance test suite to the industry on Bus Doctor Platform. Worked on FC, SAS, SATA and FCoE analyzers and generation products; and also worked on Enterprises monitoring solutions for Storage in datacenters. He holds patents in wireless technologies.

## Speakers' Biographies

Cont...

### **Dr. Young-Kook (Ryan) Yoo, Global Sales and Marketing Director, Park Systems**

**Dr. Young-Kook (Ryan) Yoo** is the Director of Global Sales and Marketing at Park Systems. Since he joined Park Systems at the beginning of 2005, he has new business developments in the industrial sector, capturing and expanding the market potential of the inline industrial AFM products and solutions offered by the XE technology. At Intematix, his first and previous employment, he was a founding scientist and VP of research and development, responsible for design and development of new combinatorial thin film deposition/screening tools and new nanomaterials discovery projects.

Dr. Yoo has a Ph.D. in Physics from University of California at Berkeley and B.A. in Physics from University of Chicago.

### **Dr. Sang-il Park, Chairman & CEO, Park Systems**

**Dr. Sang-il Park**, founder and the Chairman and CEO of Park Systems. Dr. Park is the world-recognized leader and pioneer in AFM industry where he took the lead in commercializing the early AFM technology by founding Park Scientific Instruments (PSI) in California, where he served as the Chairman and CEO for 9 years (1988~1997). Prior to founding PSI, he worked with Prof. C.F. Quate at Stanford University, the birth place of the AFM. His contribution to the AFM industry and business has been recognized by numerous awards, including Iron Tower Order of Industrial Service Merit (by Republic of Korea, 2005) and Industrial Technology Innovation Award (by Minister of Commerce, Industry, and Energy, Republic of Korea, 2004). He has authored numerous research papers, text books, and eighteen U.S. patents. He also serves as the Director of the Korean Nanotechnology Research Society, a member of the Nanotechnology Steering Committee at Korean Ministry of Science and Technology, and the Nanotechnology Information Committee at KISTI. Dr. Park has a Ph.D. in applied physics from Stanford University and B.S. in physics from Seoul National University.

### **Hank Pselos, Senior Director, Lighthouse Worldwide Solutions**

Hank Pselos is Senior Director of HDD Business for Lighthouse Worldwide Solutions, a leader in contamination control and monitoring systems. He works out of their Corporate Office in Fremont, CA and is responsible for the marketing, sales and support to the Data Storage Industry worldwide.

He joined Lighthouse in 2008 after spending over 20 years working in the HDD industry in various senior management positions. His product experience ranges from components to capital test and process equipment. Prior to Lighthouse, he held business and technical positions with Magnecomp, Xyratex, Phase Metrics and Applied Circuit Technology. Hank has spent over 7 years in Asia residing in Japan, Singapore and Thailand. During that time and subsequent to his return to the USA, he has been an active committee member of IDEMA A/P and now IDEMA USA. He holds a Bachelors Degree in Business Administration from Trinity University, Louisiana, USA.

## Speakers' Biographies

### **Sheng Thong Yin, Senior Laboratory Manager, 3M Asia Pacific Pte Ltd**

**Sheng Thong Yin** is the Senior Laboratory Manager of 3M Singapore/Asia Pacific laboratory, with responsibilities over full fledged research and development laboratory in Singapore with key focus on consumer and industrial electronics as well as activities in the RFID and fluid filtration application arena.

Prior to her current appointment in Singapore in December 2006, Thong Yin was the Senior Technical Manager of 3M Technologies (S) Pte Ltd and General Manager for Display & Graphics Business Unit. She carries two different portfolios having responsibilities in the technical as well as business operations in the Display & Graphics Business in Singapore.

She joined 3M in 1995 as an Asia Pacific Technical Service Engineer for the Construction Markets Division and subsequently moved into management position as Technical Manager for the Asia Pacific Organization with responsibility in Filtration, Home & Commercial Care and Commercial Graphics focusing on product development work.

Thong Yin graduated from Nanyang Technology University with a Bachelors' Degree in Civil & Structural Engineering, graduate diploma in Marketing from Management Institute of Singapore and Master in Business Administration from Manchester Business School.

### **Paul Hofemann, Vice President, Molecular Imprints Inc.**

**Paul** has 19 years of experience in sales, marketing and business development within the semiconductor, hard disk drive, and compound semiconductor industries. He started his professional career as a captain in the Air Force in the mid-1980s. After leaving the military, he spent 10 years in the Silicon Valley where he held senior marketing positions at Applied Materials, Semi-Gas Systems and KLA-Tencor.

He relocated to the East Coast in late 2000 to manage corporate marketing and business development for Veeco Instruments and most recently was VP of Sales for Photonics. Paul joined MII in November 2007 to focus on high growth emerging market opportunities. He holds a B.S. and M.S. in Mechanical Engineering.

### **Dr. Babak Heidari, Chief Technical Officer, Obducat AB, Sweden**

**Dr. Babak Heidari** holds Ph.D. education at Solid State Physic from University of Lund and he has several years of experience in process development of micro and nano lithography, design of electron beam lithography and imprint lithography systems, fabrication methods and process development.

Babak Heidari filed 20 patent applications and he has contributed to more than 80 publications, and appeared at numerous conferences and workshops speaking on the subject. His professional experience in the past year started at Ericsson Component as Research Engineer (1989-1990), Process Integration Engineer (1991-1997), Director, (2000-2002) and from 2002, he acts as Chief Technical Officer at Obducat AB, Sweden.

He has participated in numerous national and international projects: e.g. European projects such as the EU ESPRIT NID-project "CHANIL", the former "ESPRIT MEL-ARI project" "NANOTECH" and in the latest NAPA, dealing with development of nanoimprint technology.

## Speakers' Biographies

Cont...

He is member in several technical societies such as IEEE Electron Device Society, Materials Research Society, and American Association for Advancement of Science, Photonics Resources for Scientists and Engineers, PHANTOMS, SPIE and Semi standards. He contributed as a reference for publication of technical papers in several conferences. He has been working in the field of nanoimprint technology for more than 11 years and he knows many researchers who are actively involved in this field. He is an international expert in the field of imprint lithography technology.

### **Dr. Ajit Paranjpe, Vice President of Technology, Veeco**

Dr. Ajit Paranjpe is presently Vice President of Technology for Veeco's Process Equipment Group. He has over fifteen years of technology and senior management experience in the semiconductor and capital equipment industry. He joined Veeco from Media Lario where as VP, Lithography Products he introduced high precision collector optics for EUV lithography. Prior to Media Lario, Dr. Paranjpe served as VP, Marketing & Applications at Therma-Wave where he was responsible for their critical dimension, thin film, and implant / anneal metrology products. He joined Therma-Wave from TORREX. As CTO at TORREX he led the development of their innovative CVD & ALD mini-batch tools. Earlier he was Director of Process Technology at Veeco-CVC, Inc. where he managed process technology development and customer demonstrations for their PVD, CVD, and IBD / IBE products. He spent several years at Texas Instruments, where his technical responsibilities spanned process integration, process development, and equipment development for CMOS technology. He has broad experience related to the fabrication of semiconductor, opto-electronic & magnetic thin film devices. Dr. Paranjpe has co-authored over 30 publications and holds 44 patents.

He obtained a B.Tech. degree from the Indian Institute of Technology, and M.S. and Ph.D. degrees from Stanford University.

### **Dr. Mike Russak, Executive Vice President, Intevac Inc.**

Mike has over 35 years experience thirty five years industrial experience progressing from a research scientist to senior executive officer. His areas of expertise include: thin film materials and devices for magnetic recording, photovoltaic, solar thermal applications, semiconductor devices as well as glass, glass-ceramic and ceramic materials. Mike is currently the Executive Vice President of Business Development, Intevac, Inc. He is also a member of the Board of Directors and the Scientific Advisory Board, XsunX, Inc., a public company engaged in design, development and manufacture of thin film photovoltaic cells. From 2007 to early 2008 he served as Executive Director and Technical Advisor for IDEMA, US. From 2001 to 2006 Mike severed as President and Chief Technical Officer of Komag, Inc. From 1998 to 2001 he was Chief Technical Officer of HMT Technology. Before joining HMT as Vice President of R & D in 1993, Mike worked in the IBM Research Division in San Jose and in Yorktown Heights, N.Y. from 1985 to 1993. He began his career in 1971 as a research scientist at the Grumman Aerospace Corporation. Mike has over 95 technical publications and holds 23 U.S. Patents.

### **Dr. Iris Bloomer, Executive Vice President, n&k Technology, Inc.**

Dr. Iris Bloomer received her Ph.D. in 1976 for research in General Relativity at the University of London. She then served as Professor of Physics at San Jose State University in California for 18 years, during which time she co-founded, with Dr. Rahim Forouhi, n&k Technology, a manufacturer of optical metrology systems for the data storage, semiconductor, and photomask industries.

## Speakers' Biographies

Cont...

### **Dr. Rachid Sbiaa, Senior Research Engineer, Data Storage Institute**

**Dr. Rachid Sbiaa** is a Senior Research Engineer at Data Storage Institute. He obtained his Ph.D. in Dec. 1996 from Paris University, France, for his work on exchange-coupled multilayers with in-plane and perpendicular anisotropies.

After the graduation, he worked as research fellow in the laboratory of magnetism and thin films, CNRS (France) where he conducted research on magnetic recording materials. From Apr. 1999 until Dec 2001, he joined Toyota Technological Institute to work on magnetic recording media. His interest was focused on magnetic nanostructures and spintronic devices.

From Jan. 2001 until Mar. 2006 he joined TDK (Japan) to work on magnetic recording head and particularly read head part. In June 2006, he joined Data Storage Institute and has been working on discrete track and bit-patterned media.

### **Dr. Randall Law, Senior Research Fellow, Data Storage Institute**

**Dr. Randall Law** received his Bachelor degree for Electrical and Computer Engineering from the National University of Singapore (NUS) in 2004, receiving the Lee Kuan Yew Gold Medal, National Semiconductor Book Prize and the Asian Wall Street Journal's 5<sup>th</sup> Young Inventors Awards (Silver) that year. In 2008, he received his Ph.D. degree from the NUS Graduate School for Integrative Sciences and Engineering for his research on spin torque magnetoresistive random access memory (ST-MRAM) technology under the A\*STAR Graduate Scholarship.

He is currently a senior research fellow at DSI, conducting research on magnetic materials and device structures for applications in ST-MRAM, patterned magnetic media and hard disk read sensors.



## Singapore Conference Short Schedule

*Day 1 – Thursday, March 12, 2009*

0900 – 0910 **Opening Remarks**  
SC Lee – Chairman, IDEMA Singapore/Malaysia Management Committee  
Mark Geenen – Chairman, IDEMA Global Board of Directors

### Session 1 – Keynote Speaker

0910 – 0940 **Steven Liu, General Manager (Taipei & Shanghai), Hitachi Global Storage Technologies**  
*“Global Netbook Industry”*

### Session 2 – Market Analysis: Challenges and Opportunities

*Session Chair: Gary Davis*

0940 – 1005 **Mark Geenen, President, TrendFocus**  
*“The Netbook and the Future of Storage in PCs”*

1005 – 1040 *Coffee Break – Browse Exhibits - Networking*

1040 – 1105 **Matt Bryson, Managing Director, Avian Securities**  
*“Boom to Bust and Back Again? An Industry’s Tale”*

1105 – 1130 **Dr. Tom Coughlin, President, Coughlin Associates**  
*“The Best of Times / the Worst of Times”*

1130 – 1230 **Panel Discussion and Q&A**

1230 – 1330 *Lunch - Tour Exhibits – Networking*

### Session 3 – Advanced Storage Technologies

*Session Chair: Hank Pselos*

1330 – 1355 **Dr. Tom Coughlin, President, Coughlin Associates**  
**Dr. Ed Grochowski, Computer Storage Consultant**  
*“The Evolution and Promise of Future Storage Technologies”*

1355 – 1415 **Henry Patland, President & CEO, Integral Solutions International**  
*“Advanced Characterization Techniques for PMR heads”*

### **Session 3 – Advanced Storage Technologies**

*Cont...*

1415 – 1435 **Dr. Tony Lavia, President & CEO, Flexstar Technology**  
*“QA Testing: SSD versus HDD”*

1435 – 1455 **Manoj Vaddineni, Country Manager, Finisar Corporation**  
*“Testing challenges in the new 6G SATA Protocol”*

1455 – 1530 *Coffee Break – Browse Exhibits – Networking*

### **Session 4 – Metrology & Contamination**

*Session Chair: Chan Leng Wai*

1530 – 1550 **Dr. Sang-il Park, Chairman & CEO, Park Systems**  
*“Advanced Inline Slider Metrology with Non-Contact AFM”*

1550 – 1610 **Hank Pselos, Senior Director, Lighthouse Worldwide Solutions**  
*“Achieving Cost Savings through On-line Particle Monitoring”*

1610 – 1640 **Conference Conclusion**

❧ End of Day 1 Conference ❧

0900 – 0905 **Opening Remarks**

**Session 5 – The Role of Innovation**

*Session Chair: Chan Leng Wai*

0905 – 0930 **Sheng Thong Yin, Senior Laboratory Manager, 3M Asia Pacific Pte Ltd**  
*“Creating and Sustaining Innovative Cultures”*

**Session 6 – Future Storage in Lithography**

0930 – 0950 **Paul Hofemann, Vice President, Molecular Imprints Inc.**  
*“From Possible to Practical – The Evolution of Nanoimprint Lithography for Patterned Media”*

0950 – 1010 **Dr. Babak Heidari, Chief Technical Officer, Obducat AB, Sweden**  
*“Manufacturability of Pattern Media”*

1010 – 1030 **Dr. Ajit Paranjpe, Vice President, Veeco**  
*“Exploring Options for Patterned Media Processing”*

**1030 – 1100** *Coffee Break – Browse Exhibits – Networking*

**Session 7 – Advanced Equipment/Metrology Technology**

*Session Chair: Dr. Liu Bo*

1100 – 1120 **Dr. Mike Russak, Executive Vice President, Intevac, Inc.**  
*“Vacuum Process Solutions for High Throughput Advanced Media Manufacturing”*

1120 – 1140 **Dr. Iris Bloomer, Executive Vice President, n&k Technology, Inc.**  
*“Fully Automated Non-Destructive Metrology for Imprint Templates, DTR and BPM Media”*

## **Session 8 – Research in Data Storage Technology**

*Session Chair: Dr. Liu Bo*

- 1140 – 1200 **Dr. Rachid Sbiaa, Senior Research Engineer, Data Storage Institute**  
*“From continuous to patterned media in hard disk drives”*
- 1200 – 1220 **Dr. Randall Law, Senior Research Fellow, Data Storage Institute**  
*“Spin Torque Magnetoresistive Random Access Memory with Perpendicular Magnetisation: A Scalable Path for Ultra-high Density Non-volatile Memory”*
- 1220 – 1230 **Conference Conclusion**

❧ **End of Day 2 Conference** ❧



# CONFERENCE SCHEDULE

Day 1 – Thursday, March 12, 2009

- 0900 – 0910 **Opening Remarks**  
SC Lee – Chairman, IDEMA Singapore/Malaysia Management Committee  
Mark Geenen – Chairman, IDEMA Global Board of Directors
- 0910 – 0940 **Session 1 Keynote Speaker – Mr. Steven Liu, General Manager (Taipei & Shanghai), Hitachi Global Storage Technologies**

***“Global Netbook Industry”***

“Netbook is the fastest growing segment of the notebooks with major brands like Asus, Acer, HP, Dell and Lenovo having launched ultra-portable low cost notebooks in the past year, With global shipments of approximate 14 million units in 2008, it expects the global netbook to total 25-40 million units in 2009 and over 50 million units by 2010. Recently we even see more operators or mobile phone companies announce to utilize Netbook for their industry to grow. This is an excited product that PC industry launches in 2008, and for sure will be key engine for PC industry from now on.”

<b>Session 2 – Market Analysis: Challenges and Opportunities</b>
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***Session Chair: Gary Davis***

- 0940 – 1005 **Mark Geenen, President, TrendFocus**

***“The Netbook and the Future of Storage in PCs”***

“Steering away from the current emotion and negative outlook, this presentation will examine how the netbook is changing the face of both personal computing and client storage. Today's netbook -- perhaps the only area of demand growth for HDDs in 2009 -- represents seismic shifts in mobile computing, mobile storage cost structure, and the role of external storage. SSDs were the original storage of choice in netbooks, but user requirement for storage combined with PC makers' quest for profitability compelled the change to HDDs. But SSDs may yet play a pivotal role in netbooks, particularly as mobile computing devices evolve in the coming years.

Topics to be covered in this presentation include the fundamental changes (price, cost/performance, size) underway in mobile PCs, the HDD-SSD ratio in netbooks; and a new axiom, "The \$35 Storage Budget."”

- 1005 – 1040 ***Coffee Break – Browse Exhibits - Networking***

- 1040 – 1105 **Matt Bryson, Managing Director, Avian Securities**

***“Boom to Bust and Back Again? An Industry’s Tale”***

“Last year at this time, the HDD industry was enjoying one of its most fruitful periods as stable pricing, strong demand, and capacity constraints all combined to lift margins and profits. While SSDs were perceived as a potential threat, disappointing initial product roll-outs had pushed any real displacement into the future with rising commodity prices presenting a much more immediate concern.

## Session 2 – Market Analysis: Challenges and Opportunities

*Cont...*

Conditions have changed dramatically in the last 12 months. The banking crisis that began in the US has spread creating a global recession. Resulting declines in demand for electronic equipment have been severe with the shock to HDD makers and their component suppliers with the impact.

This presentation will explore current industry fundamentals including inventory and price conditions as well as providing some thoughts around the depth and breadth of the downturn. In addition, Avian will examine what actions might best position industry participants to survive the difficult current environment and ultimately take advantage of an eventual recovery, keeping in mind changing end market conditions including the rise of the netbook and a continued push by SSD vendors to enter the HDD market.”

1105 – 1130 **Dr. Tom Coughlin, President, Coughlin Associates**

### *“The Best of Times / the Worst of Times”*

“HDDs in 2009 will probably experience negative unit growth for the first time since 2001 with total product shipped close to that shipped in 2007. This is a reflection of the overall economy as flash memory will experience similar or even lower unit growth. While unit growth for storage devices is currently low, the need for higher storage capacity increases and thus there is a continued need for appropriate and intelligent capital investment to support that growth. When there is a full recovery, probably in 2011, annual unit growth likely will exceed 20% this growth will be enjoyed by those companies most prepared to meet emerging market demands.

This talk will look at 5 significant trends that will drive storage development over the next 3 years and fuel a recovery in storage demand. These are 1) growth of interfaces and storage devices to support rapid I/O and transaction processes, 2) increasing resolution of consumer and commercial content and more ways to use this content, 3) growth in on-line business models requiring on-line as well as local storage, 4) lower power electronics technology to control operating costs of data centers as well as extend battery life in mobile devices and 5) the growth of metadata generation to facilitate data and content management.”

1130 – 1230 **Panel Discussion and Q&A**

1230 – 1330 ***Lunch - Tour Exhibits – Networking***

## Session 3 -- Advanced Storage Technologies

*Session Chair: Hank Pselos*

1330 – 1355 **Dr. Tom Coughlin, President, Coughlin Associates**  
**Dr. Ed Grochowski, Computer Storage Consultant**

### *“The Evolution and Promise of Future Storage Technologies”*

“Today’s storage products are the result of intensive development activities in materials, structures and designs which have yielded capacities, performances and reliability to provide customers with a maximum in data retention at a minimum in cost. Major technological advances in HDD magnetic products arise from areal density growth which has resulted from: 1) head design, from GMR to TMR read technologies and PMR write designs, 2) media design using multilayer configurations relying on antiferromagnetic coupling, 3) HDD mechanical design in which small

## Session 3 -- Advanced Storage Technologies

*Cont...*

diameter and/or high RPM disks comprise an increasing portion of the market. In flash SSD designs, both NOR and NAND technologies rely on progressively narrower line widths as well as the development of newer insulators for improved reliability.

This presentation will address future HDD advances as DTR and BPM and the possibility of their implementation as well as dependencies on lithography. The production challenges of these new magnetic structures will also be discussed in the context of today's processing. For SSD, the development of multilevel storage in which multiple bits are retained in each cell could be the future direction for all flash designs provided that insulator stability and sensing electronic capability continues their current progress. This presentation will appraise the evolutions of these technologies and how each, and their follow-ons, could be implemented in future products."

1355 – 1415 **Henry Patland, President & CEO, Integral Solutions International**

### ***“Advanced Characterization Techniques for PMR heads”***

“Modern high density perpendicular head is a complicated structure with nanometer-size features.

Writer: Recent developments in high density and high data rate recording create multiple challenges for write head manufacturing related to tight geometric control of the recording pole and well-defined yoke magnetic structure. Significant variations of write head performance are usually observed during dynamic testing, however early production screening for wafer, bar or slider levels is currently not available.

Our approach is based on high resolution inductance measurement combined with yoke saturation by external magnetic field and DC write current. Changes of magnetic yoke saturation caused by combination of external magnetic field and write current provide information about overall head efficiency, coil-to-yoke coupling, pole corrosion, magnetic yoke anisotropy and defects, yoke domains, hysteresis and data rate performance. These tests can be used for early production screening of write heads.

Reader: As the read sensors become smaller, the design and alignment of hard bias magnets becomes difficult. Variations of the permanent magnet shape, magnetic properties, edge domains and potential problems with initialization and stability translate into multiple read sensor defects, such as variation of sensitivity, instability and hysteresis.

Our approach is based on thermal Ferromagnetic Resonance measurement combined with external magnetic field. Changes in Ferromagnetic Resonance peak can provide information about the permanent magnet defects, free and pinned layer defects as well as many other critical parameters of the reader.”

1415 – 1435 **Dr. Tony Lavia, President & CEO, Flexstar Technology**

### ***“QA Testing: SSD versus HDD”***

“The testing of HDD's has evolved over several decades to be a sophisticated process. There are automated procedures which can pinpoint potential points of weakness in reliability and performance. The SSD's comprised a very different technology, but present a very similar product function: namely, digital storage. Should then QA testing for SSD's be the same as for HDD's? The end system attributes are the same – capacity, reliability, access speed – but the failure modes are different. We will examine how testing methodologies compare and contrast between SSD's and HDD's. And, also propose the most effective testing procedures for SSD storage systems.”

### Session 3 -- Advanced Storage Technologies

*Cont...*

1435 – 1455 **Manoj Vaddineni, Country Manager, Finisar Corporation**

#### *“Testing challenges in the new 6G SATA Protocol”*

“This presentation will discuss the key changes introduced in the new 6G SATA protocol standard, and the challenges they present to developers and test engineers. We will introduce the test tools available for 6G SATA and how to provide test coverage using the Finisar Analyzer, Jammer and Generator. Focus will be on 6G test cases and their implementation using Finisar’s products.”

1500 – 1530 ***Coffee Break – Browse Exhibits - Networking***

### Session 4 – Metrology & Contamination

*Session Chair: Chan Leng Wai*

1530 – 1550 **Dr. Sang-il Park, Chairman & CEO, Park Systems**

#### *“Advanced Inline Slider Metrology with Non-Contact AFM”*

“Atomic Force Microscopy (AFM) is emerging as an essential tool in hard drive industry. Its ability of nanoscale measurement found powerful applications in slider manufacturing. In measuring the Pole-Tip Recession (PTR), the new automated AFM overcomes the intrinsic background curvature of a piezotube based AFM to provide adequate repeatability and reproducibility for precise manufacturing control. We found that non-contact AFM, rather than tapping mode AFM, is a critical requirement for accurate measurement of PTR since the impact from tapping force can depress the pole tip region and make PTR values appear larger than they actually are. More importantly, the linear and non-destructive scan enabled accurate angle measurements of the vertical sidewalls of various ABS structures, critical control process in slider manufacturing. Combined with throughput-efficient programmable data density, the new automated AFM constitute of a production scalable metrology solution in control of slider manufacturing processes, from PTR to writer pole to sidewall angle measurements.”

1550 – 1610 **Hank Pselos, Senior Director, Lighthouse Worldwide Solutions**

#### *“Achieving Cost Savings through On-line Particle Monitoring”*

“The Hard Disk Drive Industry including its respective suppliers is driven by cost. This has been a survival factor since the inception of the low cost HDD in the early 1980s and is even more critical today. Steps can be taken in the manufacturing process that will provide the necessary data to ascertain an advanced view into the quality of the products built. This data can then be used proactively (i.e. by using SPC) and reactively (i.e. by using an Auto-shutdown Process). These steps will result in reducing the number of contaminated parts that get built into products, minimizing scrap, optimizing process yields, minimizing production costs and creating an overall higher quality product.”

1610 – 1630 **Conference Conclusion**

↻ **End of Day 1 Conference** ↻



# CONFERENCE SCHEDULE

Day 2 – Friday, March 13, 2009

0900 – 0905 **Opening Remarks**

<b>Session 5 – The Role of Innovation</b>
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*Session Chair: Chan Leng Wai*

0905 – 0930 **Sheng Thong Yin, Senior Laboratory Manager, 3M Asia Pacific Pte Ltd**

***“Creating and Sustaining Innovative Cultures”***

“The talk on "Creating and Sustaining Innovative Cultures" will begin with a brief overview of 3M and the roots of its culture of innovation. The focus of the talk will be the six imperatives of innovation: Vision, Foresight, Stretch Goals, Empowerment, Communication, and Rewards and Recognition. The talk aims to share 3M's expertise and experiences in creating and sustaining an innovative culture.”

<b>Session 6 – Future Storage in Lithography</b>
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0930 – 0950 **Paul Hofemann, Vice President, Molecular Imprints Inc.**

***“From Possible to Practical – The Evolution of Nanoimprint Lithography for Patterned Media”***

“This talk will focus on how nanoimprint lithography technology is progressing from the laboratory towards low cost, high volume patterned media manufacturing. And not a moment too soon, as patterned media adoption is just around the corner.”

0950 – 1010 **Dr. Babak Heidari, Chief Technical Officer, Obducat AB, Sweden**

***“Manufacturability of Pattern Media”***

“The increased requirement for more storage capacity in both optical discs as well as hard drives the need for a shift in manufacturing technology. Current magnetic media technology is facing difficulties to continue to higher surface densities due to the super-paramagnetic limitations. By using isolated magnetic domains to store the data makes it possible to overcome these limitations. Both Discrete Track Recording (DTR) and Bit-Patterned Media (BPM) approaches are expected to enable storage densities well beyond 1 Tbits/in<sup>2</sup>.

The high volume Pattern Media manufacturing consist of direct-write, electron beam on a rotating substrate, lithography system to create a patterned master disk, which can be used as a mold in replication of final disks by imprint lithography. The imprint process replicates the original pattern exceptionally cost efficient, making mass production of magnetic media possible. The imprint process adopts an Intermediate Polymeric Stamp (IPS) as a replica from the mold and uses the IPS to reproduce the pattern on the final disk. However, realization of these new technologies offers challenges.

## Session 6 – Future Storage in Lithography

*Cont...*

This talk discusses the infrastructure required to enable an HVM solution, from fabrication of master mold to high-volume double-sided imprinting.”

1010 - 1030 **Dr. Ajit Paranjpe, Vice President, Veeco**

### ***“Exploring Options for Patterned Media Processing”***

“Patterned media and in particular Discrete Track Media (DTM) or also referred to as Discrete Track Recording (DTR) is the next significant technology transition in hard disk drive (HDD) technology to keep the HDD industry on the areal density growth curve. Products incorporating this technology are anticipated in 2009 with over 20% adoption in the 2010 – 2011 timeframe.

Patterned media requires the introduction of at least four new steps: nano-imprint lithography, an etch of the storage layer to magnetically separate the data tracks, gap-fill to fill the trench between adjacent data tracks, and planarization / etchback to remove the excess gap-fill material over the tracks resulting in a planar topography of the finished disk. The induction of patterned media presents a significant manufacturing challenge since high throughputs (500 – 1000 dph / tool) and low incremental costs (< \$1 / disk) combined with mature manufacturing technology must be available by 2010 for DTM to become a reality. In this talk, we will examine the processing requirements for each of these steps, and the suitability of production-proven vacuum process technologies to meet these goals.”

1030-1100 ***Coffee Break – Browse Exhibits – Networking***

## Session 7 – Advanced Equipment/Metrology Technology

***Session Chair: Dr. Liu Bo***

1100 – 1120 **Dr. Mike Russak, Executive Vice President, Intevac, Inc.**

### ***“Vacuum Process Solutions for High Throughput Advanced Media Manufacturing”***

“Recent advances in equipment design and implementation for manufacturing of advanced magnetic recording media will be presented. Topics covered will include new cathode designs for deposition of high Ku recording layer materials capable of storing data at densities of 1 Tb/in<sup>2</sup>, approaches to produce discrete track and/or bit patterned media structures and tooling to apply disk lubricants directly from the vapor phase.”

1120 – 1140 **Dr. Iris Bloomer, Executive Vice President, n&k Technology, Inc.**

### ***"Fully Automated Non-Destructive Metrology for Imprint Templates, DTR and BPM Media"***

"An optical metrology solution for imprint templates, as well as DTR and BPM media, will be presented. Simultaneous measurements of Depths, CDs, Sidewall Angles, RLT, and DLC thickness are accomplished, with complete uniformity maps of these parameters, and with excellent repeatability and reproducibility.

## Session 7 – Advanced Equipment/Metrology Technology

*Cont...*

The metrology is based on broad-band spectrophotometry covering the wavelength range from 190 to 1000nm that includes analysis combining the Forouhi-Bloomer Dispersion Equations and Rigorous coupled Wave Analysis (RCWA)."

## Session 8 – Research in Data Storage Technology

*Session Chair: Dr. Liu Bo*

1140 – 1200 **Dr. Rachid Sbiaa, Senior Research Engineer, Data Storage Institute**

### *“From continuous to patterned media in hard disk drives”*

“In magnetic recording, there were enormous efforts to keep the increase of areal density by more than 40 % annually. Bit patterned media is the future technology which can delay the superparamagnetism effect. The fabrication of nano-scales features in large area and low cost is the main challenge faced by this technology to remain attractive. Feature size with sub-10 nm can be made using high resolution lithography; however, to increase the fabrication throughput and to keep the cost low, nanoimprint lithography seems to be the most probable technology.

In the first part of the talk, bit-patterned media requirements, advantages and challenges will be presented. In the second part, I will describe the process of making mold for nanoimprint lithography using electron beam lithography. Some critical steps of pattern transfer will be presented.”

1200 – 1220 **Dr. Randall Law, Senior Research Fellow, Data Storage Institute**

### *“Spin Torque Magnetoresistive Random Access Memory with Perpendicular Magnetisation: A Scalable Path for Ultra-high Density Non-volatile Memory”*

“Magnetoresistive random access memory based on spin torque transfer switching, or ST-MRAM, has rejuvenated MRAM research in recent years as it promises significant operating power reduction and improved scalability towards high storage densities compared to traditional magnetic field-switching designs.

Magnetoresistive devices based on layers with perpendicular magnetic anisotropy (PMA) have been receiving increasing interest as they do not suffer from magnetisation curling at the edges of patterned elements, in contrast to conventional in-plane magnetic elements.

Furthermore, the theoretical expressions for spin transfer switching (STS) currents show higher spin torque efficiencies for PMA devices. More importantly, the higher anisotropy of PMA layers allows perpendicular ST-MRAM to remain thermally stable below 10 nm cell sizes, which is significantly better than other competing non-volatile memory technologies. We present our work on the optimisation of PMA and giant magnetoresistance (GMR) for perpendicular spin valves based on Co/Pd multilayers.

## Session 8 – Research in Data Storage Technology

*Cont...*

The switching behaviour of a perpendicular dual spin valve with four distinct and adjustable resistance levels, which can be flexible platform for multi-state storage to increase the ultimate storage density of MRAM, is also described. Finally, we demonstrate a significant reduction in the energy barrier against STS by the insertion of an additional spin polariser with in-plane anisotropy adjacent to the perpendicular free layer, which further reduces power consumption and improves scalability.”

1220 – 1230 **Conference Conclusion**

❧ **END OF CONFERENCE** ❧

1300 - 2000 ***IDEMA Networking Golf***



## **Who is IDEMA?**

IDEMA is the not-for-profit trade association serving the data storage industry's growth worldwide with the international trade-shows, technical conferences, industry standards programs, dinner programs, and industry assessments.

## **Who are IDEMA Members?**

IDEMA corporate members are the companies that comprises the over \$130 billion data storage industry (HDD and NAND Flash) and its robust, dynamic supply chain, including the designers and manufacturers of hard drives, heads, media, substrate, process and test equipment, materials and other parts used in data storage devices, including solid state drives, and other alternative forms of storage. All employees of IDEMA corporate member companies are IDEMA members and are entitled to full member benefits including discounts on conferences, symposia, DISKCON tradeshow and all other IDEMA activities offered worldwide. Complete details are available at [www.idema.org](http://www.idema.org).

## **IDEMA Members Benefits Include:**

- Access to “Members Only” area on IDEMA website
- Discounts of up to 40% on all IDEMA global events, including DISKCON Trade Shows and Conferences, DISKCON booth fees, symposia, and networking events.
- Exclusive advertising rights on IDEMA website, industry calendar, and DISKCON show guides worldwide.