

From the President

By Liesl Folks, President of the Magnetics Society

By the time you receive this, it will be the 50th anniversary year of the IEEE Magnetics Society! Our Society started life in 1964 within the IEEE as the "Magnetics Group", the 33rd such 'topical group' within the IEEE (we still carry the number '33' within the IEEE's accounting system.) It was one of the first groups upgraded to a 'Society', in 1972, a status accorded by the IEEE Board of Directors if a group's 'technical field has a foreseeable, long, and important future'. I encourage you to revisit the excellent summary of the early history of the Society published by R. B.



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Introductory Course on MRAM (InMRAM)

By Bernard Dieny, InMRAM Chair

This introductory course takes place in Grenoble, France, during July 2-4, 2014. It aims to help students, researchers and engineers with little or no background in magnetism to better understand the physics and working principles of this new class of magnetic memory called MRAMs (Magnetic Random Access Memory) based on magnetic tunnel junctions. These MRAM or STTRAM (Spin-Transfer-Torque RAM) memories are attracting increasing interest in the microelectronics industry. In a recent ITRS (International Roadmap on Semiconductors) report, they have been identified with Redox RAM as one of the two most promising technologies in emerging non-volatile memory, allowing scalability to and beyond the 16 nm technology node.

The course will take place over two and a half days. It will cover various aspects of MRAM technology: the basic spintronics phenomena involved in MRAM, the materials, the various categories of MRAM (pros/cons, performances, degree of maturity), comparison with other technologies of non-

volatile memory (Phase Change RAM and Resistive RAM), the fabrication process, and the perspectives of low power electronic circuits based on this hybrid CMOS/magnetic technology. The courses will be completed by an optional half day of presentation of design tools for the design of hybrid CMOS/MRAM circuits and a lab visit.

This will be the second edition of InMRAM. The first edition last year was successful, with more than 110 attendees from academic laboratories and companies all over the world. This year, attendees will have a choice between two introductory tutorials: one on magnetism for those having no background in magnetism and one on microelectronics for those having no background in microelectronics. A tutorial comparing MRAM technologies with PCRAM and RRAM technologies by a Yole Développement representative is also added to the program. The conference language will be English. For more information and registrations (starting in March 2014) visit

www.InMRAM.com.

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Goldfarb in IEEE Magnetics Letters in 2010 (DOI: 10.1109/LMAG.2009.2033258); it is a good read! The current Society Administrative Committee members and various conference organizing committees are working hard to plan commemorative activities at each of our events this year, so please look out for those – we hope you will enjoy them.

I hope that you were able to attend the 58th Annual Magnetism and Magnetic Materials (MMM) Conference which was held in downtown Denver, Colorado, in early November 2013. Conference Chair Axel Hoffmann and his energetic team put together a highly stimulating program for the conference, and attendance levels were remarkably high, especially given that it followed close on the heels of the US government shutdown. The MMM conference is jointly sponsored by the Magnetics Society and an entity of the American Institute of Physics, in a much-valued collaboration that reaches back to the very founding of the Magnetics Society.

Our IEEE Five Year Review interview was held in late November 2013 in New Jersey, and seemed to go well. The Magnetics Society was represented by Bruce Terris (President-Elect), Manuel Vazquez (Secretary-Treasurer), Ron Goldfarb (Chair, Publications) and me during the panel interview. The discussions were, as expected, far reaching, and we felt that our presentation of the many activities of the Magnetics Society

was well received by the panel of reviewers, judging by the spirited discussions. By the time you read this, we should have received the summary findings of the reviewers. We will then have a short period in which to respond, after which the report will be finalized. As soon as it is available, I will aim to make it available to the members.

It gives me great pleasure to thank the 2013 Distinguished Lecturers, Adekunle Adeyeye, Michael McHenry, Rudolf Schaefer, and Koki Takanashi for their excellent work advancing our understanding of new topics in magnetism across the globe this past year. I also take this opportunity to congratulate the 2014 Distinguished Lecturers, Hans-Benjamin Braun, Jonathan Coker, Ron Jansen, and Tim St Pierre. Please look out for their lectures in 2014, which will doubtless be excellent.

It has been a great privilege to work with a superb team within the Administrative Committee over the past year, and I wish to warmly thank outgoing members Ermanno Cardelli, Oliver Gutfleisch, Kannan Krishnan, Dimitri Litvinov, Alexandru Stancu, Yoshishige Suzuki, and Koki Takanashi for their service to the Magnetics Society during their 2011-2013 elected terms..

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Applauding 50 Years of IEEE Fellows

By Rosann Marosy, Manager, Fellow Activities, IEEE

In 2014, IEEE will mark its 50th Fellow Class. It represents decades of honoring IEEE Fellows whose extraordinary accomplishments have changed the world.

The IEEE grade of Fellow was born in 1964 out of the merger of the American Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE). The emphasis on the elevation was and still is reserved for select IEEE members who have made important contributions to the advancement of engineering, science, and technology, bringing the realization of significant value to society.

Only one-tenth of one percent of the total voting membership can be elevated in any one year. Over the last fifty years, IEEE

has elevated roughly 10,000 members to this honor. This is a very small percentage compared to the total membership. Unquestionably, Fellows are the crown jewels of the organization. One can only imagine what the next fifty years will bring, and the new technology that will be developed, discovered, or taught, and what new IEEE Fellows will be recognized for their achievements.

Throughout the year, various celebrations will take place to honor those who have achieved this distinction. If you know an IEEE Fellow, congratulate him/her again for receiving this honor. You can recognize them personally, or you can acknowledge them publicly at region meetings, society meetings, section meetings, and/or conferences.

Norio Takahashi (1951-2013)

By John R. Brauer

Norio Takahashi was born in Japan in 1951. He passed away in Okayama, Japan on February 26, 2013.

Prof. Takahashi received the B.E. degree from Okayama University in 1974 and the M.E. and Ph.D. degrees from Kyoto University in 1976 and 1982, respectively. He was a Professor in the Department of Electrical and Electronic Engineering, Chair of Electromagnetic Device Laboratory of Okayama University, Vice President of Power and Energy Society, IEE of Japan, Vice President of the International Compumag Society, and an IEEE Fellow.

Prof. Takahashi's major interests were the development of numerical methods for calculating magnetic fields and optimal design methods for magnetic devices. His most recent paper "Modeling of magnetic properties of GO electrical steel based on Epstein combination and loss data weighted processing" with other co-authors appears in the January 2014 issue of the IEEE Transactions on Magnetics.

Many of us were privileged to spend time with Norio at the many international conferences that he attended all around the globe. He always was unfailingly kind and helpful. He will be sorely missed.

Brian Chalmers (1935-2013)

By Andy Knight, Secretary, Electrical Machines Committee, IEEE Industrial Applications Society

Brian Chalmers passed away on November 16, 2013, after a short but difficult battle with cancer. He had a long and distinguished academic career. As a postgraduate student at Bristol University, he studied electrical machines, using early computers programmed in machine code rather than the high level languages of today.

Prof. Chalmers was awarded a Ph.D. degree in 1961. After a period in industry with the English Electric Company at Stafford, he joined the staff of the Department of Electrical Engineering and Electronics at the University of Manchester Institute of Science and Technology (UMIST) in 1963. His research interests encompassed design of large induction motors, eddy-current effects and their exploitation, inverter-fed drive systems, and novel permanent-magnet machines.

Prof. Chalmers authored more than 140 published technical papers and several books. He established excellent contacts with industry and with the staff of the corresponding department at Manchester University. The result was the Manchester Machines Research Group (MMRG) set up in the 1980s.

From 1994 to 2006 Professor Chalmers was the Chair of the International Conference on Electrical Machines (ICEM). On



one occasion, he brought the Conference, with its several hundred delegates, to Manchester.

Prof. Chalmers took his turn of duty as Head of Department between 1985 and 1989. He proved to be a first-class administrator of a very large department. With the academic and support staff, together with the postgraduates and undergraduates, he was responsible for hundreds of people.

Prof. Chalmers' research was recognized at national and international levels and he participated in international conferences, traveling extensively. Sometimes he was able to take time out for his mountaineering adventures and other exercise. On one occasion he participated in a double marathon – Pietermaritzberg to Durban, through the Valley of a Thousand Hills, raising funds for charity.

Professor Chalmers was awarded the degree of Doctor of Science (D.Sc.) in 1978 for his very substantial and sustained contribution to scholarship.

Brian will be sadly missed by electrical engineering research workers worldwide.

New IEEE Fellows

By Gareth Hatch, Newsletter Editor

Eight members of the Magnetics Society have been elevated to IEEE Fellow for 2014:

- **Magdalena Salazar-Palma**, for contributions to the application of numerical techniques to electromagnetic modeling (Universidad Carlos III de Madrid);
- **Jiming Song**, for contributions to algorithms in computational electromagnetics (Iowa State University);
- **Peter Fischer**, for contributions to the development and application of high resolution X-ray magnetic imaging (Lawrence Berkeley National Laboratory);
- **Bruce Gurney**, for contributions to spin valve Giant Magnetoresistance sensors for magnetic recording systems (HGST);
- **Axel Hoffmann**, for contributions to nanomagnetism and manipulation of spin current (Argonne National Laboratory);
- **Migaku Takahashi**, for contributions to thin film technology for high-density recording media and heads (Tohoku University);
- **Kiruba Sivasubramaniam**, for contributions to high power density electric machines for renewable energy and aerospace applications (GE Research Center); and
- **Charles Sullivan**, for contributions to the design of power electronic circuits and magnetics (Dartmouth College).

Magnetic Actuators and Sensors - 2nd Edition

ISBN-10: 1118505255 ISBN-13: 978-1118505250

Hardcover - 400 pages

December 9, 2013, John Wiley / IEEE Press

US \$125.00

In 2006 the IEEE Magnetics Society sponsored the first edition of the book "Magnetic Actuators and Sensors" by John R. Brauer. It has now been updated and expanded by about 25%. There are many new sections on topics ranging from magnetic separators to spin valve sensors.

An accessible, comprehensive guide on magnetic actuators and sensors, the second edition of Magnetic Actuators and Sensors includes the latest advances, numerous worked calculations, illustrations, and real-life applications. Covering magnetics, actuators, sensors, and systems, with updates of new technologies and techniques, this exemplary learning tool emphasizes computer-aided design techniques, especially magnetic finite element analysis, commonly used today. Detailed calculations, numerous illustrations, and discussions of discrepancies make this text an invaluable learning tool for practicing engineers, physicists, and students.

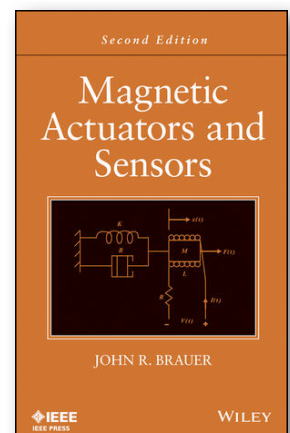
The text is divided into four parts:

- Part One - Magnetics: offers an introduction to magnetic actuators and sensors as well as basic electromagnetics, followed by an examination of the reluctance method, the

finite element method, magnetic force, and other magnetic performance parameters;

- Part Two - Actuators: explores DC actuators, AC actuators, and magnetic actuator transient operation;
- Part Three - Sensors: details Hall effect and magnetoresistance as they apply to sensing position etc. Also discussed are many other types of magnetic sensors; and
- Part Four - Systems: covers aspects of systems common to both magnetic actuators and sensors, including coil design and temperature calculations, electromagnetic compatibility, electromechanical finite elements, and electromechanical analysis using system models. The final chapter sets forth the advantages of electro-hydraulic systems that incorporate magnetic actuators and/or sensors.

A major thrust of this book is teaching by example. In addition to solved examples provided by the author, problems at the end of each chapter help readers to confirm their understanding of new skills and techniques. References, provided in each chapter, help readers explore particular topics in greater depth. The book also has a web site containing many data files for software solutions.



2014 Distinguished Lecturers

The IEEE Magnetics Society selected four Distinguished Lecturers (DLs) for 2014. They are:

- ▶ Jonathan Coker (HGST, USA);
- ▶ Hans-Benjamin Braun (University College Dublin, Ireland);

- ▶ Ron Jansen (AIST, Tsukuba, Japan);
- ▶ Tim St. Pierre (University of Western Australia, Australia).

Each DL makes his own schedule, so contact them early via their respective institutions.

IEEE Magnetics Society 2014 Distinguished Lecturer

Opportunities and Challenges in Two Dimensional Magnetic Recording

Jonathan Coker, HGST, a Western Digital company, San Jose, California, USA

Because conventional perpendicular recording is now reaching its useful limits, the hard-drive industry is heavily invested in several alternative recording technologies. The majority of these configurations (such as heat-assisted magnetic recording, microwave-assisted magnetic recording, and bit-patterned magnetic recording) secure their advantages by solving essential problems in the writing process. In contrast, two-dimensional magnetic recording (TDMR) expends its essential focus on the reading process, by providing multiple looks at adjacent written information via multiple read sensors on one slider. This “sleeper” technology was rather abruptly recognized, at a recent conference of recording technologists, as a leading contender for the next generation of HDD technology.

While generally thought of as a more conventional option than the alternatives, TDMR nevertheless has profound impact on magnetic component design and on elements of the entire supporting recording system.

These impacts will be reviewed in detail from both a magnetic system and a signal-processing perspective. Innovations in linear and nonlinear system identification techniques in two dimensions will be proposed and illustrated.

Jonathan Coker is a champion of innovative recording technologies that improve the performance, efficiency, and areal density of hard-disk drives (HDDs). As HGST’s Chief Architect for HDDs, Coker plays a leading role in HGST’s shingled and two-dimensional recording technology efforts. Dr. Coker was educated at Wheaton College (B.A., Liberal Arts and Engineering, 1983) and at the University of Minnesota (B.S.E.E., 1984; M.S.E.E., 2006; E.E. Ph.D., 2008). He began his career in 1984 at IBM, where he made key contributions to the development and integration of such industry firsts as thin-film disks, magnetoresistive heads, and partial-response, maximum-likelihood data channels. During 2001-7, Dr. Coker was a supervising researcher at the Mayo Clinic, working on

advanced circuit architectures and implementations for medical and defense-related applications. He is a frequent guest lecturer at industry gatherings and seminars. Dr. Coker holds about 50 patents in the areas of magnetic recording, radar devices and medical applications. He has written 22 journal articles or conference papers. Contact: jonathan.coker@hgst.com



Topological Effects in Nanomagnetism: From Perpendicular Recording to Monopoles

Hans-Benjamin Braun, School of Physics, University College Dublin, Ireland

Similar to knots in a rope, the magnetization in a material can form robust configurations. Such topologically stable structures include domain walls, vortices and skyrmions which are not just attractive candidates for future data-storage applications, but are also of fundamental importance to current memory technology. For example, the creation of domain-wall pairs of opposite chirality delimits the thermal stability of bits in present high-anisotropy perpendicular recording media. The increasing demand for higher data-storage density forces us to understand topological defects at ever decreasing length scales, where thermal & quantum effects play an increasingly important role.

This talk will be adapted to the interests of the audience and will start with an overview over topological defects in magnetic systems. As a practical application it is shown how thermal domain wall nucleation affects the design of perpendicular magnetic recording media. In a second part, it is demonstrated how the geometric Berry's phase allows micromagnetics to be extended to include quantum effects. As an important consequence it will be shown how the chirality of a classical domain wall translates into quantum spin currents which in turn can be used for information transport. All concepts will be

illustrated by state-of-the-art experiments, which encompass the techniques of polarized neutrons and synchrotron x-rays.

The final part of the talk will discuss how magnetic monopoles emerge as topological defects in densely packed arrays of nano-islands which effectively interact as dipoles, a system also known as 'artificial spin ice'. In contrast to conventional thin films, where magnetization reversal occurs via nucleation and extensive domain growth, magnetization reversal in 2D artificial spin ice is restricted to an avalanche-type formation of 1D strings. These objects constitute classical version of Dirac strings that feed magnetic flux into the emergent magnetic monopoles. It is demonstrated how the motion of these magnetic charges can be individually controlled experimentally and used to perform simple logic operations.

[1] H.B. Braun, "Topological effects in nanomagnetism: from superparamagnetism to chiral quantum solitons", *Adv. Phys.* 61, 1-116 (2012).

[2] E. Mengotti, L.J. Heyderman, A. Fraile Rodriguez, F. Nolting, R.V. Hu'gli, and H.B. Braun, "Real space observation of Dirac strings and magnetic monopoles in artificial kagome spin ice", *Nat. Phys.* 7, 68 (2011).

Hans-Benjamin Braun is currently Associate Professor for Theoretical Physics at University College Dublin (Ireland). After studies in Physics and Mathematics he received his diploma degree from the University of Basel (Switzerland) and in 1991 he earned his PhD in Theoretical Physics at ETH in Zurich. After postdoctoral research at the Physics Department and the Center for Magnetic Recording Research at the University of California at San Diego, he was awarded a NSERC International Fellowship to work at Simon Fraser University in Vancouver (Canada). Subsequently he returned to Switzerland to take up a position as Senior Scientist at the Paul Scherrer Institute (PSI). He joined the Faculty of the School of Physics at University College Dublin (UCD) in 2004, where he founded and leads the group in Condensed Matter Theory supported by the Science Foundation of Ireland.

Prof. Braun developed the theory for nonuniform thermally activated magnetization reversal in nano-wires which now forms the basis for the design of perpendicular magnetic recording media. Well before it was recognized experimentally, he theoretically predicted quasi one-dimensional behavior in

magnetic nano-wires and introduced the now widely used notion of domain-wall chirality. His work led to the prediction of the spontaneous emergence of spin currents in quantum spin chains, an effect that he and his collaborators subsequently observed via spin-polarized neutron scattering. Furthermore he proposed and interpreted a



series of experiments on nano-lithographic arrays that led to the discovery of emergent monopoles in artificial spin ice together with colleagues from PSI and UCD. In addition to numerous publications in top research journals he also authored popular articles for the French and German versions of *Scientific American* and he holds two patents.

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Silicon Spintronics

Ron Jansen, National Institute of Advanced Industrial Science and Technology (AIST),
Tsukuba, Japan

Worldwide efforts are underway to create a revolutionary and energy-efficient information technology in which digital data is represented by the spin orientation of electrons. Implementing spin functionality in silicon, the mainstream semiconductor, has the potential to create broad impact. Remarkable advances in the creation and control of spin polarization in silicon have therefore generated much excitement. This lecture provides a transparent picture of silicon spintronics, including the key developments and achievements, our current understanding, as well as the unsolved puzzles and challenges that stimulate researchers in the field.

First, the basic idea of spin-based information technology and silicon spintronics is introduced. Ferromagnets have non-volatile memory functionality, whereas semiconductors provide amplification and transistor action. What if we integrate ferromagnets and silicon - magnetic memory and logic computing? Then the main building blocks are described: one needs to be able to create spin polarization in the silicon, to

manipulate it, and thereafter detect the spins. The generation of a spin flow by electrical means (driven by a bias voltage) or thermal means (driven by a heat flow) are discussed. Ferromagnetic tunnel contacts are shown to provide a robust method to do this, at room temperature.

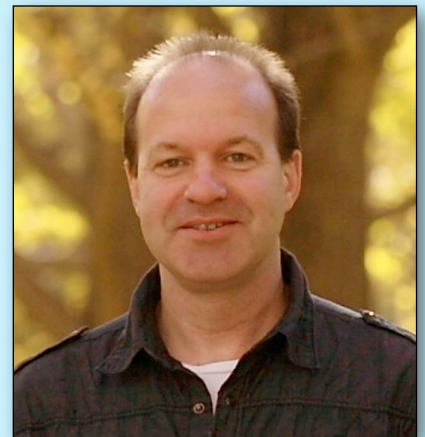
The lecture concludes with a prospect on future developments, which certainly includes more surprises as silicon spintronics comes of age.

- [1] R. Jansen, Silicon spintronics, *Nature Materials* 11, 400-408 (2012).
- [2] J.C. Le Breton, S. Sharma, H. Saito, S. Yuasa and R. Jansen, Thermal spin current from a ferromagnet to silicon by Seebeck spin tunnelling, *Nature* 475, 82-85 (2011).
- [3] S.P. Dash, S. Sharma, R.S. Patel, M.P. de Jong and R. Jansen, Electrical creation of spin polarization in silicon at room temperature, *Nature* 462, 491-494 (2009).

Ron Jansen received a PhD in Experimental Physics from the University of Nijmegen (the Netherlands) in 1997, and was a postdoctoral associate at the Massachusetts Institute of Technology (MIT, Cambridge, USA). After that he moved to the University of Twente (the Netherlands), where he became a tenured assistant professor, associate professor, leader of the Nano-Electronics Research Chair and group leader with the Netherlands Foundation for Fundamental Research on Matter (FOM). Since 2010, Dr. Jansen works at the National Institute of Advanced Industrial Science and Technology (AIST, Tsukuba, Japan), where he is now a prime senior researcher at the Spintronics Research Center.

Dr. Jansen has published 100+ technical articles in peer-reviewed journals, as well as book chapters and reviews, and has given more than 110 invited scientific presentations. He received personal award grants from the Royal Netherlands Academy of Arts and Sciences and from the Netherlands

Organization for Scientific Research. He served on international advisory boards and program committees of various international conferences in magnetism (MMM, INTERMAG & joint meetings, JEMS), semiconductor devices and spintronics.



Dr. Jansen has also been an editor of *IEEE Transactions on Magnetics* and the *European Journal of Applied Physics*.

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Magnetic Materials in Medicine: Applications in Diagnosis, Management, and Treatment of Disease

Tim St. Pierre, School of Physics, The University of Western Australia, Australia

Scientists working in the field of magnetic materials are increasingly focusing their attention on new applications of magnetic detection and magnetic transduction techniques in the biomedical sciences. Iron is a key functional element in the human body and surpasses all other naturally occurring elements in the body in terms of both the variety and magnitudes of its magnetic states. In many diseases, the quantity and the magnetic state of iron are altered by the disease. Hence, detecting and measuring the magnetic properties of the iron in vivo or in samples of body fluids can give insights into the state of health of a human subject.

Example applications include assessing the risk of organ damage in hereditary hemochromatosis [1], determining the dose of iron chelator drugs required for patients with thalassemia [2], and identifying infectious forms of the malarial parasite in finger-prick blood samples [3]. Scientists are also working on the development of synthetic magnetic nanoparticles that can be injected into the human body for the diagnosis and treatment of disease. They can be used to enhance the contrast in magnetic resonance images to help identify tumors in tissue [4], to act as local heat sources to treat cancer [5], and to carry, concentrate, and release drugs more specifically than drugs without a magnetic carrier [6]. The physical and chemical principles behind these applications and their impact on medicine will be presented at a level suitable for a generalist audience.

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[4] Sun, C., J.S.H. Lee, and M. Zhang, Magnetic nanoparticles in MR imaging and drug delivery. *Advanced Drug Delivery Reviews*, 2008. 60(11): p. 1252-1265.

[5] Maier-Hauff, K., et al., Efficacy and safety of intratumoral thermotherapy using magnetic iron-oxide nanoparticles combined with external beam radiotherapy on patients with recurrent glioblastoma multiforme. *Journal of Neuro-Oncology*, 2011. 103(2): p. 317-324.

[6] Mejías, R., et al., Dimercaptosuccinic acid-coated magnetite nanoparticles for magnetically guided in vivo delivery of interferon gamma for cancer immunotherapy. *Biomaterials*, 2011. 32(11): p. 2938-2952.

Tim St. Pierre heads the BioMagnetics Research Group in the School of Physics at the University of Western Australia, Perth, Australia. He obtained his BSc and PhD degrees from the University of Liverpool (UK). Following postdoctoral positions at Murdoch University in Western Australia, Prof. St. Pierre was appointed to the faculty at the University of Western Australia in 1995.

Professor St Pierre's main scientific interests are in the application of physics to medicine and biotechnology. His research focuses on applications of magnetic measurement and characterization techniques for the non-invasive characterization of iron in biological systems. He and his team developed the non-invasive liver iron measurement technology, FerriScan®, which has been commercialized and used in over 20,000 patient measurements in hospitals around the world.

Prof. St. Pierre is currently working on magnetic methods for detection of parasites in human blood and fecal matter. He has published over 150 peer reviewed papers in the fields of iron and magnetism in biology, biotechnology, and medicine.

In 2010, Prof. St. Pierre won a Clunies Ross Award from the Australian Academy of Technological Sciences and Engineering for his work on non-invasive measurement of tissue iron deposits.

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58th Annual MMM Conference (MMM 2013)

By Axel Hoffmann, General Chair, MMM 2013

The 58th Annual Conference on Magnetism and Magnetic Materials was held in Denver during November 4–8, 2013.

The first day of the conference started with a tutorial on “Berry Phases in Magnetism”, with hour-long presentations each by Yaroslav Tserkovnyak (University of California Los Angeles), Karin Everschorr-Sitte (TU München and Universität Köln), and Yoshinori Onose (University of Tokyo). An opening reception then followed, which was generously sponsored by the IEEE Magnetics Society. The reception was at the cavernous Katie Mullen’s Irish Pub (next to the conference hotel), which dished up plenty of international hors d’oeuvres with a slight Irish touch. Furthermore, live entertainment was provided by the Physics Rock and Roll Orchestra from the University of Colorado, Colorado Springs, which included various distinguished members of the magnetism research community and managed to entice at least some of the MMM attendees to show their dance skills. Most informal feedback suggested that this opening reception was very well received and an excellent opportunity to rub shoulders with old and new friends. A great thanks to Conference Manager Diane Melton who helped organizing this event and many other creature comforts for the attendees.

The next day the scientific program, assembled by Program Chairs Andrew Kent and Suzanne te Velthuis together with their international Program Committee, started in earnest with eight parallel oral sessions and nine parallel poster sessions each morning and afternoon (except there were no poster sessions Friday afternoon). The program consisted of close to 1,600 contributed talks, eight symposia with five invited talks each and another 40 invited talks distributed throughout the rest of the oral sessions.

In addition, besides the tutorial talks on Monday, there were two evening presentations. On Tuesday we took advantage of the fact that the conference was close to one of National Institute of Standards and Technology (NIST) laboratories and had a plenary presentation from John Kitching on state-of-the-art atomic magnetometers. On Thursday, the evening session first started off with the Awards Chair, Michael Pechan, honoring the finalists for the student oral presentation awards; Nicholas Aimon (MIT), Alan Farhan (PSI and ETH), Tinxiang Nan (Northeastern University), Elizabeth Rapoport (MIT), and Jean-Philippe Tetienne (University Paris Sud); and the winner,

Yanang Geng (Rutgers University). This brief presentation was followed by a plenary presentation from Nobel Laureate Albert Fert (CNRS/Thales and University Paris-Sud) on future prospects of spin-orbit coupling for spintronic developments.

Besides the scientific program the conference provided other services to select attendees such as student travel awards and this year for the first time support for child care expenses. Other activities included student lunches with experts, where students could sign up to discuss during lunchtime (food was provided by the conference) any topic of their interest with various established experts in the magnetism community. This event proved to be so popular that it was fully booked within less than one hour.

Another well-received part of the conference was the selection of best poster presentation awards, for which each poster presentation had been eligible. In total there were 14 poster awards distributed (for a complete list of the winners look into the program of the next MMM conference), which were sponsored by GMW. The IEEE Magnetics Society provided additional support for the Women’s Networking reception (held Thursday late afternoon) as well for the internet access within the conference area.

Lastly, one mainstay of each MMM conference is the Bierstube, which commenced during the last hour of each afternoon poster session, and was sponsored on two nights (Tuesday and Thursday) by Materion and on Wednesday by AIP Publishing. This year the Bierstube featured each day a different Colorado brewery (Oskar Blues, Avery, and Odell) selected by our local Beer Chair John Moreland. This gave all the attendees the opportunity to sample a wide variety of excellent local beers from a state that features a beer-brewer as a governor. And in the midst of it all were 22 (as far as I can tell happy) exhibitors organized by Exhibits Chair Mingzhong Wu and Conference Manager Jennifer Fiske.

Overall, as almost with every other past MMM conference, this MMM conference exceeded our expectations with approximately 1,500 attendees (around 40% from North America, 40% from Asia, and 20% from Europe and the rest of the world). Besides making the Treasurers Yumi Ijiri and Maria Varela happy, this should also lay an excellent foundation for the next MMM Conference in Honolulu this year. In the meantime,

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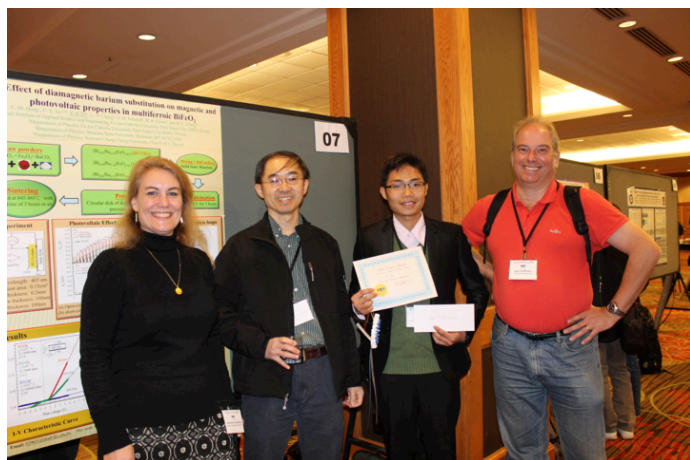
58th Annual MMM Conference (MMM 2013) *continued from page 9*

you can look forward to select conference papers, organized by Publication Chair Hariharan Srikanth and his capable team of editors, as well as one last time by the long-time AIPP Coordinator Janis Bennett; we enjoyed having you part of our team for one last encore! The conference papers should be published in the Journal of Applied Physics later this year, and in fact some are already available online as of now. With that I would of course also like to thank all the attendees and

presenters, who joined this very stimulating and enjoyable conference. Of course special thanks goes to all the volunteers, who were listed throughout this report (I apologize if I forgot anybody). I am looking forward to seeing many of you again at the next MMM conference (November 3–7, 2014). I am sure that the next General MMM Chair, Chris Leighton, will organize for us an even better event in Honolulu (and if not there is always the beach next door).



One excited participant, Albrecht Jander, at the MMM Conference in Denver 2013. Note the conference logo designed by Publication Chair Brian Maranville (Picture courtesy of Mingzhong Wu).



One of the best poster award recipients, C. Tu, from Fu Jen Catholic University after receiving his award. On the left, program co-chair Suzanne te Velthuis and on the right, general chair Axel Hoffmann (Picture courtesy of Mingzhong Wu).

New Senior Members

The following members of the IEEE Magnetics Society were recently elevated to the grade of Senior Member.

Oct 2013: Guadalupe Gonzalez, Matthew Jewell, Edward Murdock and Huaiwu Zhang.

Nov 2013: Jennifer Ammentorp, Mark Hinrichs, June Lau and R I Rao.

For further information, visit the IEEE Web site at:

http://www.ieee.org/membership_services/membership/grade_elevation.html

Lebanon Chapter News

By Ernst Huijter, AP/MTT/MAG Chapter Treasurer

During December 12-13, 2013, Prof. Rudolf Schaefer of the Leibniz Institute for Solid State and Materials Research (IFW) Dresden, Germany visited Lebanon at the invitation of the AP/MTT/MAG chapter. The first day he came to the American University of Beirut, where he toured some of the facilities and gave his talk titled “Magneto-optical Analysis of Magnetic Microstructures” to about 30 attendees including students and

faculty members. On the second day he repeated his talk at Notre Dame University in Louaize also for about 30 attendees. The AP/MTT/MAG chapter is grateful to Rudolf Schaefer for having visited Lebanon and having enlightened us about magnetic microstructures, domains, and their visualization.

Hong Kong Chapter News

By Philip Pong, Hong Kong Chapter Chair

In the past few months, the Hong Kong Chapter hosted three distinguished lectures and one technical seminar. Prof. Rudolf Schaefer, Prof. Koki Takanashi, and Prof. Adekunle Adeyeye gave their lectures in Hong Kong on August 23, September 2 and October 21, respectively. Prof. Young Keun Kim, Chairman of the Seoul Chapter, visited us on December 18. He gave a talk on multifunctional magnetic-photonic nanostructures for immunotherapeutic applications. Prof. Kim also interacted with some of the student helpers of Hong Kong Chapter during lunch. A short excursion to the Victoria Peak was arranged by the student branch.

Five student helpers have just left the Chapter because of graduation. The Chapter has however recruited seven student helpers to strengthen the student branch. The information of the student branch is available from the Chapter website: <http://www.eec.hku.hk/ieec/magsoc>. To enrich the visit of colleague to Hong Kong Chapter, we will add in more tourist information in the Chapter homepage such as “10 Things You Must Do in Hong Kong”. Stay tuned.



Seoul Chapter News

By Young Keun Kim, Seoul Chapter Chair

The Seoul Chapter of the IEEE Magnetics Society organized a one-day seminar on 'Advances in Magnetic Materials' at Korea University, Seoul, Korea, on December 9, 2013. Three speakers were invited and each speaker gave an one-hour in-depth discussion on the following topic: "STT-MRAM overview, scalability and future challenges" by Prof. Kyung-Jin Lee at Korea University, "Materials for ultrahigh density magnetic recording" by Prof. Kazuhiro Hono at National Institute for Materials Science (NIMS), Tsukuba, Japan, and "Development of composite magnets using magnetic powders" by Prof. Jong Ryoul Kim at Hanyang University, Ansan, Korea.

The Chapter also invited Prof. Koki Takanashi, Institute for Materials Research (IMR), Tohoku University, on December 4, 2013 to deliver his Distinguished Lecture on "Advanced spintronic materials for generation and control of spin current".



Spain Chapter News

By Victorino Franco, Spain Chapter member

The annual meeting of the Spain Chapter took place in Bilbao on November 28th 2013. This was a good opportunity to review the different activities organized by the Chapter throughout Spain during the year and to plan the future activities for 2014. It is worth noting the 13 talks given by Distinguished Lecturers of the IEEE Magnetic Society during 2013 in 6 different cities, which included Barcelona, Bilbao, Madrid, San Sebastian, Sevilla, and Zaragoza.

The fruitful Sister Society Agreement with the Spain Magnetic Club (CEMAG) has been renewed until 2016, which allows us to co-program activities. As an example, the Spain Chapter took active part in the annual scientific meeting of the CEMAG on November 29th, where we sponsored the invited talk "Towards 3-dimensional spintronics" by Prof. Russell Cowburn (University of Cambridge), followed by a lively discussion (see photo). The Spanish Chapter is also funding 13 scholarships for students to attend the Winter Course "Frontiers in Magnetism", which will take place at the Centro de Ciencias de Benasque Pedro Pascual (Benasque, Spain) from February 9th until February 15th 2014.

Among other future activities, members of the Chapter are deeply involved in the organization of the 20th International Conference on Magnetism, which will take place in Barcelona in July 2015.



UK & RoI Chapter Co-Organizing Magnetism 2014

By Dan Allwood, Chair, UK & RoI Chapter Chair

Magnetism 2014 is a new meeting for the United Kingdom and Republic of Ireland Chapter, to be held in Manchester during April 7-8, 2014. The meeting is being jointly organized by the UK & RoI Chapter of the IEEE Magnetics Society and the Institute of Physics, and it is our intention to provide a forum for researchers from across the broad range of UK magnetism activities to network to present their latest work.

We hope that this will help maintain the vigor of UK and RoI magnetism and inspire new research collaborations. We are delighted that the conference will include a plenary lecture by Nobel Laureate Prof. Sir Andre Geim (The University of Manchester), the Wohlfarth Lecture by Dr Astufumi Hirohata

(University of York) and a 2014 IEEE Magnetics Society Distinguished Lecturer Dr Ron Jansen (AIST, Japan).

We plan to keep registration costs low to encourage wide participation.

Abstract deadline: 31st January 2014

Early registration deadline: 7th March 2014

Registration deadline: 28th March 2014

See <http://magnetism2014.iopconfs.org/home> for more details.

Book Publishing with John Wiley / IEEE Press

By Ron Goldfarb, Publications Chair

IEEE Press publishes technical books in all the fields served by IEEE. Since 2001, IEEE Press has published jointly with John Wiley & Sons, which has a worldwide distribution network. Books are published in different formats such as e-books, on-line books, and Amazon Kindle, and are available through IEEE Xplore (IEEE members receive a 25% discount), John Wiley's website, and on-line retail outlets.

The Magnetics Society has sponsored publication (or re-publication) of the following titles:

- **Magnetic Actuators and Sensors**, 2nd Edition, by John R. Brauer, December 2013, Hardcover;
- **Developments in Data Storage: Materials Perspective**, by S. N. Piramanayagam (Editor), Tow C. Chong (Editor), November 2011, Hardcover;
- **Introduction to Magnetic Materials**, 2nd Edition, by B. D. Cullity, C. D. Graham, December 2008, Hardcover;
- **The Physical Principles of Magnetism**, by Allan H. Morrish, January 2001, Hardcover;

- **Magnetic Hysteresis**, by Edward Della Torre, September 2000, Paperback;
- **Magneto-Optical Recording Materials**, by Richard J. Gambino (Editor), Takao Suzuki (Editor), September 1999, Hardcover;
- **Magnetic Disk Drive Technology : Heads, Media, Channel, Interfaces, and Integration**, by Kanu G. Ashar, September 1996, Hardcover; and
- **Ferromagnetism**, by Richard M. Bozorth, August 1993, Hardcover.

If you are interested in publishing with John Wiley/IEEE Press with Magnetics Society sponsorship, please contact the society's IEEE Press liaison, Petru Andrei, via pandrei@fsu.edu, or visit the Wiley-IEEE Press websites, www.wiley.com/WileyCDA/Brand/id-13.html and www.ieee.org/publications_standards/publications/books/index.html

Conference Calendar

- Jan 29-30, 2014 Magnetics 2014
Orlando, FL, USA
Web site: www.magneticmagazine.com/conferences/
- Feb 16-20, 2014 TMS Annual Meeting: Magnetic Materials for Energy Applications IV
San Diego, CA, USA
www.tms.org/TMS2014
- Mar 2-5, 2014 International Conference on NdFeB Magnets
Ningbo, China
www.ndfebpm.com
- Mar 27-29, 2014 4th International Workshop on Magnetic Particle Imaging (IWMPI 2014)
Berlin, Germany
www.iwmpi.org
- Mar 31 - Apr 1, 2014 9th Conference on Computation in Electromagnetics (CEM 2014)
London, UK
conferences.theiet.org/cem/index.cfm?origin=/cem2014
- April 7-8, 2014 Magnetism 2014
Manchester, UK
magnetism2014.iopconfs.org/home
- May 4-8, 2014 2014 Intermag Conference
Dresden, Germany
www.intermagconference.com
- July 2-4, 2014 Introductory Course on Magnetic Random Access Memory (InMRAM)
Grenoble, France
www.inmram.com

To list your conference in the Newsletter Conference Calendar, please contact the Editor

About the Newsletter

The purpose of the IEEE Magnetics Society Newsletter is to publicize activities, conferences, workshops and other information of interest to the Society's members and other technical people in the general area of applied magnetics. Manuscripts are solicited from Magnetics Society members, conference organizers, Society Officers & other volunteers, local chapters, and other individuals with relevant material.

The Newsletter is published in January, April, July and October electronically on the Magnetics Society webpage at www.ieeemagnetics.org. Submission deadlines are January 1, April 1, July 1, and October 1 respectively.

Please send articles, letters & other contributions to the Newsletter Editor:

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