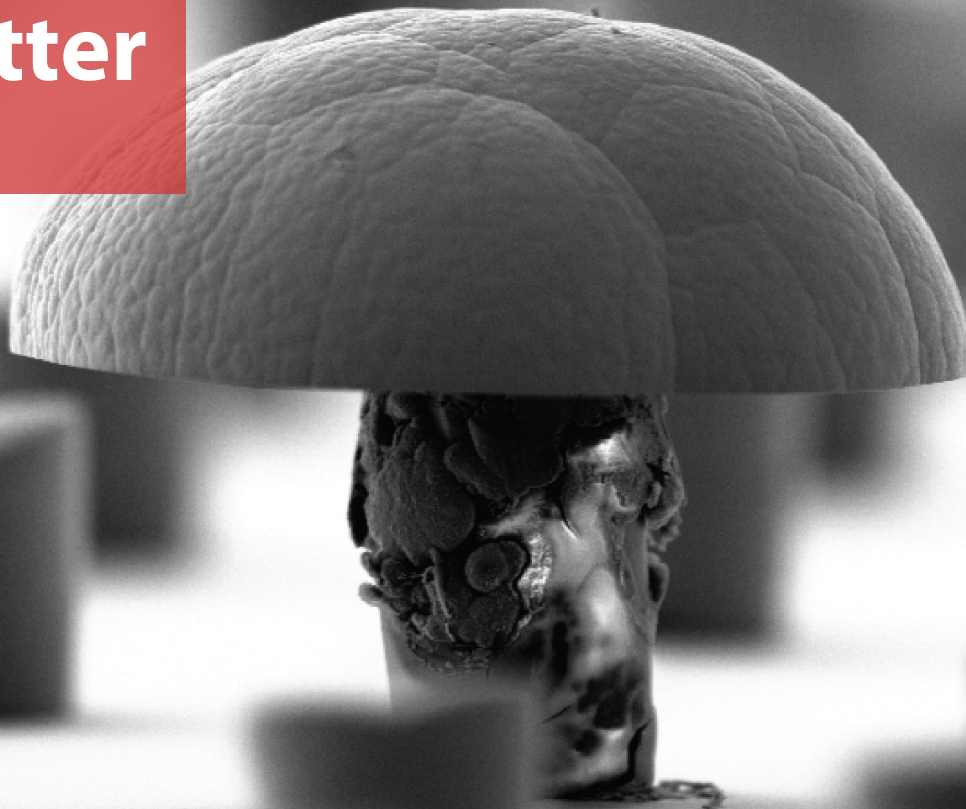


Newsletter

August 2018



'Masked Mushroom': SEM image of structures from pores overfilled by Ni electroplating. Credit: Riccardo Bertacco (Milan Polytechnic, Italy).

Newsletter of the IEEE Magnetics Society

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From the President

By **Manuel Vázquez**, *President of the IEEE Magnetics Society*

The International Conference on Magnetism (ICM 2018) was held in San Francisco, California during July 15-19, 2018. This was the first time that the conference has been held in the USA since 1985. ICM is likely the largest conference on a broad spectrum of topics in magnetism such as strongly correlated electrons systems; spin-systems and magnetic structures; spintronics, magnetization dynamics and micromagnetics; nanomagnetism; and magnetic materials and technologies.



This triennial conference is organized under the auspices of the International Union of Pure and Applied Physics (IUPAP). This time, the organization was shared between the IEEE Magnetics Society and the American Institute of Physics (AIP), in a similar fashion to the joint MMM-INTERMAG conferences. It was a great success from both organizational and scientific viewpoints.

My congratulations to the team of organizers chaired by Allan MacDonald, with Liesl Folks (Past President of the IEEE Magnetics Society) as Secretary General, with particular contributions from Mark Stiles (Program Chair), Julie Borchers and Petru Andrei (Co-Treasurers), Tom Thomson and Hari Srikanth (Co-Editors), Tiffany Santos (Industry Liaison) and Philip Pong (Publicity Chair).

My congratulations also to Burkard Hillebrands and Kai Liu, current President and Secretary respectively of the C9 Commission on Magnetism of the IUPAP, and very well known to members of our Society. As a side note, it is my pleasure to advance conversations to establish a collaboration between the Society and the C9 Commission, in terms of coordination of conferences, summer schools and the like.

The short interval between the Singapore INTERMAG Conference in April 2018 and ICM 2018, meant that we delayed the next committee meetings of the Society, including the next Administrative Committee (AdCom) meeting, until the Joint MMM-INTERMAG Conference in Washington, DC in January 2019, which will be chaired by Suzanne te Velthuis.

The 2018 Summer School was held in Quito, Ecuador during June 3-8, 2018 at the University of San Francisco de Quito. It was well organized by Dario Niebieskikwiat and his team. The students profited from a very friendly atmosphere and from the outstanding lectures offered by the speakers. I should also mention the wonderful excursion through the forest to an impressive waterfall, and having lunch in the restaurant facing

the Cotopaxi volcano.

I have also had the opportunity to join the team visiting the sites for the 2023 INTERMAG Conference in Asia. All candidates—Sendai (Japan), Daejeon (Korea) and Sydney (Australia)—seemed to be highly qualified for the task.

This time of year is also the time for nominations and preparation for elections. In the next few weeks we will conduct the voting to elect eight new AdCom members, and shortly afterwards the next Secretary/Treasurer.

Members of the committees are especially busy at this time of the year, so warm in many countries in the Northern hemisphere. During the IEEE meeting series held in New Brunswick, New Jersey (June 20-24, 2018), the five-year reports for both *IEEE Magnetics Letters* and the *IEEE Transactions on Magnetics* were presented by Ron Goldfarb and Petru Andrei (with Pavel Kabos joining via telephone) respectively. They made excellent reports and their explanations perfectly clarified the comments by the reviewers. In addition, we are preparing the five-year Society report to be defended next November.

As in the preceding opportunities, I wished to finish this brief report with my kind invitation to all of you to contribute to the different activities of the Society. Please, contact me if you have new ideas or concerns.

Two Special MRAM-Related Events at IEDM 2018 Organized by the IEEE Magnetics Society

By **Bernard Dieny** and **Bruce Terris**

The IEEE International Electron Devices Meeting (IEDM) is the main annual conference of the IEEE Electron Devices Society and this year will be held during December 1-5, 2018, in San Francisco, California. With the rising interest of the microelectronics industry in STT-MRAM, it is very important to strengthen the relationship between the microelectronics and magnetism communities in order to accelerate the development of this new hybrid technology. For that reason, two special events related to MRAM technology are being organized in conjunction with IEDM.

The first is a **special poster session entirely dedicated to MRAM**, including MRAM materials, phenomena, technology and testing; hybrid CMOS/MTJ technology and circuits; and spin logic. Similar MRAM poster sessions took place at IEDM 2016 and IEDM 2017 which were very successful, with 33 posters presented and very active cross-disciplinary discussions. This session is organized technically by the IEEE Magnetics Society

and will be embedded in the IEDM 2018 conference. This event will be a great opportunity to bring together experts in magnetism and in microelectronics. It will appear as a special memory session in the IEDM program.

This event will be a great opportunity for spintronics students, researchers and engineers to meet colleagues from microelectronics community. We strongly encourage teams from the magnetism community working on MRAM to send attendees to IEDM 2018, and to present posters related to MRAM, spintronics circuits or spin logic during this special poster session. The posters will be selected by a small international program committee formed by members of the IEEE Magnetics Society.

There will be no publications associated with these posters in the Proceedings of IEDM 2018. Of course, any presenting author can also submit regular digests for oral presentations following the **usual procedure of the IEDM organization**. The session will also be used to advertise our Society and the INTERMAG and MMM conferences, within the microelectronics community.

If you want to present a poster during the MRAM poster session, send a half-page abstract to bernard.dieny@cea.fr before September 28, 2018. In the list of authors, underline who will be the presenting author. The notice of acceptance/rejection will be sent by mid-October 2018. Participants to this poster session will have to register at IEDM as regular attendees.

The second event is the **10th MRAM Global Innovation Forum** which will take place in San Francisco on December 6, 2018. This is a one-day forum organized for the day following IEDM 2018 in the same hotel (Hilton Union Square). The Forum will consist of 10 invited talks from leading experts and a panel discussion. Last year, the 9th edition of this Forum gathered 280 attendees.

Various MRAM related topics will be covered including STT-MRAM technology, memory and processor demonstrations, spin orbit torque MRAM, and the needs, challenges and potential of MRAM. The Forum was originally initiated by Samsung Semiconductor, and this Forum marks the 10th edition of the series.

The Forum is entirely sponsored by Samsung Semiconductor so that registration to the Forum is free of charge, including a free lunch. However the number of attendees is limited. To register for the Forum, please send an email to bernard.dieny@cea.fr with first name, last name, contact email and affiliation. A confirmation email will be sent to you. The deadline to register for the Forum is 10th November 2018.

We strongly encourage teams from the magnetism community working on MRAM, to send attendees to IEDM 2018 and to attend these two events.

IEEE Magnetics Society 2018 Achievement Award

By Randy Victora and Jian-Gang Zhu

Roy Chantrell has received the 2018 Magnetics Society Achievement Award, the highest technical honor of the IEEE Magnetics Society. Prof. Chantrell earned his PhD in physics from the University of Wales in 1977. He then held several academic positions, until becoming Professor of Condensed Matter Theory at the University of York in 2004. He also served as a director at Seagate Research from 2001 to 2004. Prof. Chantrell was named an IEEE Fellow in 2000.



Prof. Chantrell's research focuses on the theoretical investigation of systems of interacting magnetic spins. He developed a kinetic Monte-Carlo model within which the time is included as a physical quantity rather than as Monte-Carlo steps, which is often the case. This was applied to important investigations of the effects of interactions in granular magnetic systems and more recently to the modelling of magnetic hyperthermia giving a unified model of the major heating mechanisms.

At an early stage, Prof. Chantrell recognized the limitations of the standard micromagnetic approach as a zero-Kelvin approximation and his group was the first to numerically implement 'Langevin Dynamics' in which a random field is introduced to model the effect of a finite temperature. He has also pioneered the concept of atomistic and multiscale calculations in magnetism and has applied the techniques to developing powerful models of recording media and permanent magnets. This work has had considerable impact as exemplified by the first model of FePt media using atomistic techniques parameterized by ab-initio information, a model which is now extensively used in simulations of HAMR.

Working with the group of Theo Rasing (Nijmegen), Prof. Chantrell has shown that a novel linear reversal mechanism is central to the optomagnetic reversal observed by the Rasing group. The atomistic model also explained the remarkable observation of a transient ferromagnetic-like state in ferrimagnetic GdFeCo and made the unexpected prediction that magnetization reversal can be initiated by a heat pulse alone, in the absence of any external symmetry breaking magnetic field.

The citation for Prof. Chantrell's award reads: "For contributions to the theory of interacting spin systems and application to the understanding of magnetic recording media and ultrafast magnetization processes."

Prof. Chantrell joins a distinguished list of past recipients: Fred Luborsky (1981), Herb Storm (1982), Harold Lord (1984), Joe Suozzi (1985), Fritz Friedlaender (1986), Andrew Bobeck (1987), Floyd Humphrey (1988), Paul Biringner (1989), Daniel Gordon (1990), Emerson Pugh (1991), Yoshifumi Sakurai (1992), William Doyle (1993), Richard Barker (1994), Mark Kryder (1995), Koosuke Harada (1996), Gordon Slemon (1997), Stan Charap (1998), Dave Thompson (1999), Denis Mee (2000), Fred Hagedorn (2001), Shun-ichi Iwasaki (2002), Carl Patton (2003), Yutaka Sugita (2004), Robert Fontana (2005), Neal Bertram (2006), John C. Mallinson (2007), Jack H. Judy (2008), Roger Wood (2009), Isaak Mayergoyz (2010), Jian- Gang (Jimmy) Zhu (2011), John Slonczewski (2012), Michael Mallery (2013), Randall Victora (2014), Takao Suzuki (2015), Luc Berger (2016), and William H. Butler (2017).

New Senior Members

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

June 2018: Raghu Sekhar Babu Angara, Hyunsoo Yang, Andrew Ferencz, Stefan Cosemans, Desmond Ebenezer and Pedram Khalili Amiri.

For more information on elevation to Senior Member, visit the [IEEE Senior Member Grade Web page](#).

Summer School Below the Equator

By Dario Niebieskikwiat, Local Organizing Committee Chair and Atsufumi Hirohata, Education Committee Chair

The 11th IEEE Magnetics Society Summer School (MSSS) was held during June 3-8, 2018 at the Universidad San Francisco de Quito (USFQ) in Ecuador. This is the second time that the Society successfully organised its Summer School in South America, where the participants enjoyed 12 excellent lectures, including four Distinguished Lectures. All the participants stayed at the same hotel in the new city centre of Quito and took the bus to the University for lectures.

MSSS had an attendance of 72 students, including 60 students supported by the Society, six by the Universidad San Francisco de Quito, four by the Embassy of Argentina in Quito together with the International Center for Theoretical Physics (ICTP), Quantum Design and USFQ, and two by their supervisors. The Society received 83 applications and accepted 66 students based on the quality of their applications. Unfortunately, five



Summer School attendees at the main entrance to the University Hall.

students could not attend due to visa or other problems. The participants showed a good geographical balance with 34 from Europe, 13 from Asia/Pacific, 13 from South America and 12 from North America.

The programme was made up of high-quality lectures, with topics ranging from fundamental magnetism to magnetic recording and memory. The program was started by Prof. Antonio Azevedo (Universidade Federal de Pernambuco) with a lecture on Fundamental Magnetism, which provided an excellent background on magnetism and generated active questions and answers. In the afternoon, Prof. Ekkes Brück (Technische Universiteit Delft) presented on Functional Magnetic Materials, covering the development and applications of permanent magnets and bulk magnetic materials.

The second day started with the lecture on Spintronics given by Prof. Xiaofeng Jin (Fudan University), covering the discovery of electron spins through to their recent applications, including spin Hall effects and magnetic skyrmions. Prof. Matthieu Bailleul (Université de Strasbourg) then delivered the lecture on Magnetization Dynamics in the afternoon, continuing the topic of spin dynamics, at elevating frequencies up to terahertz.



A Summer School lecture.



Discussions during a coffee and tea break.

On the fourth day, Dr. Tiffany Santos (Western Digital) explained the historical and recent development of Magnetic Recording and Magnetic Memory from the industrial viewpoint. Prof. Hans-Benjamin Braun (University College Dublin) continued to describe the theoretical background and some calculations for spintronic behaviour, in the lecture on Simulation and Theory on Magnetism.

The last day was predominantly focused on nanoscale applications and characterisation. Prof. Sara Majetich (Carnegie Mellon University) explained Nanomagnetism, ranging the fabrication of nanoscale ferromagnetic particles to their applications. The School was concluded by Dr. Rudolf Schaefer (IFW Dresden) with the lecture on Magnetic Measurements, which compared all the currently available magnetic characterisation techniques.

On each day, a Society Distinguished Lecturer explained their cutting-edge research after lunch: Prof. Yoshichika Otani (University of Tokyo) on Spin Conversion Phenomena in Spintronics; Prof. Can-Ming Hu (University of Manitoba) on Cavity Spintronics; Prof. Alison B. Flatau (University of Maryland) on Structural Magnetostrictive Alloys; and Prof. Mitsuteru Inoue



Participants visit the Machay Waterfall.

(Toyohashi University of Technology) on Magnetic Phase Interference in Artificial Magnetic Lattices. These Distinguished Lecturers provided excellent introduction to their latest research.

After dinner on the first and fourth days, poster sessions were organised. The students were split into two groups, each of which was asked to present their posters during one of the sessions. Due to the lively discussion during the session, both sessions had to be extended by almost 90 minutes.

All the lecturers and committee members scored the posters and selected poster award. Five Silver awards went to Maryam Artemis Massouras, Toni Hache, Steven Louis, Jeremy Theo Letang, and Nico Kerber, and one Gold award went to Nicolás Agenor Loayza Romero. Congratulations!



Participants visit Cotopaxi Pungo.

At the end of the School, Students-Led Project Presentations were given. All the participants cast their votes after the presentations, resulting two winners. The first awarded project was on "Magnetic combination therapy: a novel, drug-free approach to cancer treatment" with Michael Stanton, Irati Rodrigo Arrizabalaga, Daniela Paola Valdés and Emma Welbourne. The second awarded project was on "Comparison of DMI measurement techniques" with Jeffrey Brock, Pierre Vallobra, Aviniash Kumar Chaurisava, Katherine Nygren, Anni Cao and Pablo Domenichini. Each of them receives up to USD 5,000 to carry out their project and plans to present their achievements at the Joint MMM-Intermag in 2019, to be held in Washington, DC. Congratulations to them!

Besides the lecturers, the School arranged lovely social events, starting with the Welcome Reception in the evening on the Sunday, held in a restaurant near the University. The third day was fully devoted to excursion to Cotopaxi, which is about two hours away from the hotel. The participants walked through the trail to the Condor Machay Waterfall and had lunch at Cotopaxi

Pungo. Everyone enjoyed the sunshine and nice food. On the last day, The Farewell Party was arranged in the Hall at the University, where the participants had great experience with local dance and music until very late.

It should be noted that all the participants expressed their gratitude for the meticulous organisation of the local committee: Dario Niebieskikwiat (Chair), Vincent Vlaminc (Secretary), Sara Majetich (Treasurer), Silvana Guitarra (Local Treasurer) and Melissa Infusino (Poster Award Coordinator). The success of this meeting and the recognition it achieves is due to the efforts of the Selection Committee: Dan Wei (Chair), Albrecht Jander, Josep Fontcuberta, Leszek Malkinski, Michael Farle, Nora Dempsey, Osamu Kitakami, Tae Hee Kim, Alessandro Veltri and Leonardo Basile' and the Program Committee: Brian Kirby, Chih-Huang Lai, Mingzhong Wu, Sara Majetich, Stefano Sanvito, Hyunsoo Yang, Maria José Benitez and Atsufumi Hirohata (Chair). Last but not least, we are thankful for financial support from the IEEE Magnetics Society, Quantum Design, the Argentinian Embassy, ICTP and USFQ.

Note that the next summer school in 2019 will be held in North America. The IEEE Education Committee is currently selecting the venue and will announce the details by the end of August. We encourage PhD students to apply for it!

Conference Calendar

By **Gareth Hatch**, Newsletter Editor

16th International Conference on Molecule-based Magnets (ICMM2018)

September 1-5, 2018 - Rio de Janeiro, Brazil

Joint European Magnetic Symposia (JEMS 2018)

September 3-7, 2018 - Mainz, Germany

International Conference on Caloric Cooling (Thermag VIII)

September 16-20, 2018 - Darmstadt, Germany

Nanomaterials 2018 (M-SNOWS 2018 & N4S 2018)

September 25-28, 2018 - Nancy, France

18th Biennial Conference on Electromagnetic Field Computation (CEFC 2018)

October 28-31, 2018 - Hangzhou, China

Asia-Pacific Magnetic Recording Conference 2018 (APMRC 2018)

Nov 9-15, 2018 - Shanghai, China

2019 Joint MMM-Intermag Conference

January 14-18, 2019 - Washington, District of Columbia, USA

International Conference on Fine-Particle Magnetism (ICFPM19)

May 27-31, 2019 - Gijón, Spain

Frontiers in Biomagnetic Particles

August 5-7, 2019 - Telluride, Colorado, USA

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

About the Newsletter

The purpose of the Newsletter of the IEEE Magnetics Society is to publicize activities, conferences, workshops and other information of interest to Society members and other people in the area of applied magnetics.

Contributions are solicited from Society members, Officers & other volunteers, conference organizers, local chapters, and other individuals with relevant material. The Newsletter is published quarterly on the Society webpage at: <http://www.ieeemagnetics.org>

Please send all contributions via email to the Newsletter Editor, Gareth Hatch, at: g.p.hatch@ieee.org

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