

Newsletter

February 2021

'One Explosion': Electrodeposition of FePd into pre-patterned substrates.
Source: Matteo Cialone (Universitat Autònoma de Barcelona, Spain.)

Newsletter of the IEEE Magnetics Society

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From the President

By **Masahiro Yamaguchi**, *President of the IEEE Magnetics Society*

I hope all of our members, family, and colleagues are staying safe and healthy in spite of the COVID-19 pandemic that impacts all of us around the globe. I hope the year 2021 will be healthier and more peaceful than 2020.

It is my great pleasure and honor to write my first newsletter article as incoming President of the IEEE Magnetics Society. While I am excited to start in my new role, I am aware of the big responsibility of leading the world's largest magnetics community and providing better, safer service to our Society membership. As the first President from Asia, I would also like to enrich our society's activities in Asia, as in all parts of the world. We value the support and collaboration of all of you, especially the members of the Administrative Committee (AdCom), our standing committee and subcommittee members and chairs, editorial boards, and recording secretaries.

I would like to start by thanking my predecessor, Pallavi Dhagat, for her outstanding leadership. Pallavi made participation in the Society more open. Pallavi's leadership in the wake of COVID-19 was clear for all to see. She paid special attention to the format of major conferences to provide the best possible benefit to the conference participants while trying to minimize financial losses. An ad hoc committee worked hard to produce our first fully virtual conference, Magnetism and Magnetic Materials (MMM) 2020, which was very successful in terms of technical content and financial balance. Our Society has remained financially healthy as a result. I will continue planning for the best possible outcomes under different scenarios to safely bring our community together to share scientific data and human networks at future events, and carefully watch publications.

I would also like to thank former president Manuel Vázquez for his thoughtful and friendly advice on every aspect of our Society's operations. It has been a great help for us.

I would also like to acknowledge the outgoing committee chairs and welcome new chairs: Ron Goldfarb worked as Publications Chair for a long time. He organized all aspects of the publication program. He is replaced by Thomas Thomson. Tom has years of experience in the editorial program of the Society. Brian Kirby was Education Chair. He led the Society's Summer School, tutorial and special sessions at conferences sponsored by the Society, and more. Sara Majetich, an experienced committee member, will chair the Education Committee. Oksana



Chubykalo-Fesenko has served as Chapters Chair. She monitored and coordinated the operations of existing chapters, and promoted the creation of new chapters in Canada, China, India, Japan, Thailand, and South America. Hans Nembach moves to this position from Membership Chair. Hans led the Around-the-Clock, Around-the-Globe (AtC-AtG) student-led conference to huge success in August 2020, together with the Technical and Education Committees. Yizheng Wu assumes the Membership Chair. I hope he will actively promote activities in Asia. I am very happy to continue working with Jürgen, Mark, Philip, Rudi, Beth and Mingzhong. Pallavi and Atsufumi Hirohata are ex-officio chairs as Past President and President-Elect, respectively. Here is the roster of our committee chairs.

- Thomas Thomson – Publications Committee;
- Hans Nembach – Chapters Committee;
- Jürgen Fassbender – Honors and Awards Committee;
- Mark Kief – Finance Committee;
- Sara Majetich – Education Committee;
- Philip Pong – Publicity Committee;
- Rudolf Schaefer – Conference Executive Committee;
- Bethanie Stadler – Distinguished Lecturer Committee;
- Pallavi Dhagat – Nominations Committee;
- Yizheng Wu – Membership Committee;
- Mingzhong Wu – Technical Committee; and
- Atsufumi Hirohata – Planning Committee.

I would also like to thank our outgoing AdCom members – Cindy Dennis, Peter Fischer, Simon Greaves, Mathias Kläui, June Lau, Larissa Panina, Teruo Ono, and Thomas Thomson. Their participation provided great value to our global membership.

I take this opportunity to welcome our new Secretary/Treasurer, Ron Goldfarb, as well as our new AdCom members, Paolo Bortolotti, Alison Flatau, Mathias Kläui, Nikola Morley, Shigeki Nakagawa, Hans Nembach, S.N. (Prem) Piramanayagam, and Laura Steren. I am looking forward to working with the new volunteer team to meet the best interests of our members.

We celebrate their accomplishments alongside those of the recipients of the 2021 Society Awards. Eric Fullerton (UC San Diego) received the Achievement Award for his contributions to groundbreaking and sustained contributions to the invention and development of modern exchange-coupled magnetic recording media and devices. Geoffrey Beach (MIT, Cambridge, Massachusetts) was recognized with the newly established Mid Career Award for pioneering contributions to the understanding of chiral exchange interactions, spin-orbit torques, domain wall and skyrmion dynamics in magnetic films,

heterostructures and nanostructures. Kerem Y. Camsari (UC Santa Barbara) was recognized with the Early Career Award for contributions to the theory and practice of using low barrier nanomagnets for probabilistic computing. Manuel Vázquez (Spanish National Research Council, CSIC, Madrid) received the Distinguished Service Award for tremendously strengthening IEEE Magnetics Society outreach worldwide and dedicated efforts to engage new people in service to the Society. We will congratulate 2020 and 2021 award recipients at the online Plenary Session during INTERMAG 2021.

I take this opportunity to announce that our Distinguished Lecturers for 2020 will continue in 2021, as only 26 lectures were given before the pandemic closed down travel, and 126 lectures were cancelled. Chapter Chairs are encouraged to contact Bert Koopmans, Mathias Kläui, Tim Mewes and Masashi Shiraishi for their excellent lectures on emerging topics in magnetics.

Finally, I would like to thank Cindy Dennis, General Chair for the 2020 INTERMAG Conference, which was expected to be held in Montreal in May 2020 but unfortunately was canceled due to the COVID-19 pandemic. Cindy and the organizing committee members had to cancel the conference after having prepared every aspect of the technical program and professional development opportunities.

I would also like to thank Christopher Marrows, Chair of the 2020 MMM Conference, for his quick and hard work to change the conference format from on-site to fully virtual successfully in November 2020. The program featured excellent speakers and special sessions that were very well received by the attendees.

Please visit our Society's [website](#) to learn more about our accomplishments, where you will find the list of chapters, renewed sister societies, new volunteer signup forms and more. A grand revision of the Society's Constitution and Bylaws is close to completion. The revised Constitution will be on the website soon for the membership of the society to review.

In closing, please feel free to contact me by e-mail, at on-site conferences or virtually. Your thoughts and feedback are more than valuable for the future of the IEEE Magnetics Society.

Masahiro Yamaguchi can be contacted via email:
masahiro.yamaguchi@ieee.org.

Eric Fullerton Receives the 2021 Achievement Award

By Randy Victora, University of Minnesota

Eric Fullerton will be presented the 2021 Achievement Award of the Magnetics Society at the virtual INTERMAG 2021. This is the highest award bestowed by the Magnetics Society, given in

recognition of exceptional technical accomplishments in the field of magnetics.

The citation for Prof. Fullerton's award reads: "*For groundbreaking and sustained contributions to the invention and development of modern exchange-coupled magnetic recording media and devices.*"

Prof. Fullerton has been a leading researcher in magnetism and magnetic recording for more than 25 years. He is probably best known for the first implementation of antiferromagnetically exchange-coupled (AFC) longitudinal recording media, where the bit is stored in two magnetic layers whose magnetizations are anti-parallel. This technology allowed further scaling to magnetically thinner recording media that remains thermally stable and achieved improved resolution. The media directly addressed the problem posed by the superparamagnetic limit and the demagnetization created by the longitudinal configuration. It allowed longitudinal recording to reach higher densities than otherwise would have been possible. Perhaps of equal importance, it demonstrated that ultra-thin coupling layers, now a key component of modern media, could be used to engineer recording media performance. AFC media was first shipped in IBM's mobile products in 2001 and was extended to laminated AFC media where a 4 Å Ru spacer layer was sufficient to de-correlate the transition noise thus producing large increases in signal-to-noise ratio.

Prof. Fullerton has continued to contribute to the recording of information on magnetic materials, both through mainstream magnetic recording and novel approaches such as all-optical switching and spin-torque transfer. He also led an effort on exchange-spring structures, for longitudinal recording and then perpendicular recording, and for novel heat assisted magnetic recording (HAMR). Prof. Fullerton's team and international collaborators have recently demonstrated all-optical switching of ferromagnetic films and recording media. They have also demonstrated the first experimental spin-torque switching of perpendicular anisotropy magnetic nanopillars and further demonstrated that this geometry has improved efficiency and scales to smaller device size compared to in-plane devices.

Prof. Fullerton received his Doctorate in Physics from University of California, San Diego (UCSD) in 1991. He worked as a Physicist at Argonne National laboratory from 1993-1997 and then joined industry, originally IBM, and then Hitachi GST after their recording operations were purchased from IBM. In 2006, Prof. Fullerton joined UCSD as endowed chair professor in Electrical



and Computer Engineering (ECE) and nanoengineering (NE). He is currently director of the Center for Memory and Recording Research at UC San Diego. He is a fellow of the American Physical Society, a Member of the National Academy of Engineering, and a past winner of the 2012 AIP Industrial Applications of Physics Prize and the 2002 IBM Outstanding Technical Achievement Award. Dr. Fullerton is an IEEE Fellow.

Manuel Vázquez Receives the 2021 Distinguished Service Award

Submitted by Alfredo Garcia Arribas, Spanish Chapter Chair



In 2016 the IEEE Magnetics Society Distinguished Service Award was established to honor outstanding service to the Magnetics Society. Recipients are characterized by sustained voluntary service significantly beyond the typical. The award is presented at the INTERMAG Conference each year.

The recipient for 2021 is Manuel Vázquez, from the Spanish National Research Council (CSIC), "*for greatly strengthening the IEEE Magnetics Society's reach worldwide and for dedicated efforts to engage new people in service to the Society.*" The joint nomination came from the Society's Spanish Chapter and its sister society, the Spanish Magnetics Club (Club Español de Magnetismo, CEMAG).

Prof. Vazquez joined the IEEE in 1995, becoming a Senior member in 2007. He founded the Spanish Magnetics Society Chapter in 2008, and was its first Chapter Chair (2008-2012). He has been continuously contributing to the management activities of the Society since 2010, when he was elected Administrative Committee Member (2010-2013), Secretary/Treasurer (2014-2015) and President-elect (2016-2017). He served as President of the Society during 2017-2018, during which he successfully expanded the role and reach of the Society globally, in support of the international magnetics community.

In addition to his leadership of the Spanish chapter, Prof. Vázquez has played an outstanding role in the promotion of IEEE Magnetics Society activities in Spain. With over 1600 attendees, the INTERMAG 2008 conference in Madrid had the largest attendance of the series to date. Apart from attracting magnetic scientists and professionals from less active regions to the Society, two specific endeavors of special relevance can be underlined among his contributions: the strengthening of the Society's presence in Latin America, building on his own

cultural/historical connections; and the spread of the Society in other less-active regions, particularly in Eastern Europe and Russia. These efforts built on Prof. Vázquez's success in nurturing cross-cultural trust and open communication and have benefited the Society greatly.

Prof. Vázquez studied in Madrid (Complutense University) and did postdoctoral work in Germany (Max-Planck-Institute, Stuttgart), and Denmark (TU Denmark, Copenhagen). He is Professor of Research since 1996 at CSIC, Spain. He was Director of the Laboratory, Instituto de Magnetismo Aplicado, UCM-RENFE-CSIC (1992-2000), founder of the Nanomagnetism and Magnetization Processes Group at ICM/CSIC and International Head of the Magnetic Sensors Lab, Urals Federal University, Ekaterinburg, Russia (since 2015). He served as co-founder and President of CEMAG and has held multiple other management positions. Prof. Vázquez was granted the Salvador Velayos Magnetism Award (CEMAG, 2017) in recognition of his extensive contribution to applied magnetism and international promotion of Spanish magnetism. From his many scientific achievements, his study of cylindrical nano and microwires, both from basic and applied points of view, stands out in particular.

All these outstanding achievements make Prof. Vazquez a distinguished officer of the IEEE Magnetics Society and substantiates the 2021 Distinguished Service Award for his continuous and committed service to the Society and his contributions to the extension and globalization of the Society in less active regions.

Geoffrey Beach Receives the 2021 Mid Career Award

Submitted by Jürgen Fassbender, Honors and Awards Committee Chair

Geoffrey Beach will be presented with the 2021 Mid Career Award of the IEEE Magnetics Society at the upcoming INTERMAG virtual conference. The aim of this Award, which was established in 2021 and is now awarded for the first time, is to recognize scientists and engineers at the mid-stages of their career for outstanding research and technological contributions in a field which is represented by the IEEE Magnetics Society.

Prof. Beach receives the award "*for pioneering contributions to the understanding of chiral exchange interactions, spin-orbit torques, domain wall and skyrmion dynamics in magnetic films, heterostructures*



and nanostructures."

Prof. Beach's research successfully combines synthesis of thin-film materials with advanced characterization techniques to explore the fundamental properties of magnetic materials, with the additional aim of working towards potential spintronic applications.

During his remarkable career, Prof. Beach has made pioneering and fundamental discoveries in magnetic thin-film materials, heterostructures and nanostructures. In a groundbreaking paper his group showed in 2013 that chiral exchange interactions associated with interfaces combined with spin-orbit torques, enable highly efficient current driven domain wall motion. This research highlighted the combined effects of Dzyaloshinskii-Moriya Interaction and spin-orbit torque and set a pathway for next-generation high-efficiency and high-density information technology spintronic devices. Prof. Beach was also among the first to demonstrate voltage control of interfacial magnetism and its application to spintronic devices. He demonstrated that magnetic skyrmions can be stabilized at room temperature and that their distinct topology results in a so-called skyrmion Hall effect. Prof. Beach has systematically investigated approaches for the creation, ultrafast control and minimizing skyrmion size for practical applications. In each of these areas, he has significantly advanced the understanding and application of magnetic thin-film materials, heterostructures and nanostructures. These achievements are now honored by the 2021 Mid Career Award.

Prof. Beach received his doctorate in Physics from the University of California, San Diego (UCSD) in 2003 under the supervision of Ami Berkowitz, with research on a new interfacial high-moment CoFeO phase that is stabilized in proximity to a ferromagnetic metal layer. During his post-doctoral years, he worked on the nature of domain-wall dynamics driven by magnetic fields and spin-polarized currents. In 2008 Prof. Beach joined MIT, becoming a full professor in 2018.

Kerem Y. Camsari Receives the 2021 Early Career Award

Submitted by Masahiro Yamaguchi, Early Career Award Subcommittee Chair

The Early Career Award was established in 2017 to better support researchers in the early period of their career. The award is given to an individual within five years of the completion of his or her PhD, who has shown outstanding scientific or technical achievements which are significantly beyond the average performance of a person at that career level. The Early Career Award consists of cash and travel awards and life membership in the Society.

This year's Early Career Award recipient is Kerem Y. Camsari (University of California, Santa Barbara, USA) for "*contributions to the theory and practice of using low-barrier nanomagnets for probabilistic computing.*"



Dr. Camsari received his PhD from Purdue University in 2015, where his thesis advisor was Supriyo Datta. He

established the modular approach to spintronics by combining electronic transport and magnetization dynamics equations into a unified SPICE-compatible circuit platform, which included the non-equilibrium Green's function and spin diffusion (Valet-Fert) equations with the Landau-Lifshitz-Gilbert (LLG) equation. Between 2015-2020, he worked as a postdoctoral researcher at Purdue University where he has spearheaded the group's transition to probabilistic (p) bits and circuits, invertible Boolean logic and hardware emulation of p-circuits as a bridge between classical and quantum circuits. Dr. Camsari has been an Assistant Professor at the Department of Electrical and Computer Engineering at University of California, Santa Barbara since July 2020.

Thermal stability is one of the most fundamental properties of magnetic materials. Most applications of magnetic materials require stable magnetization processes in a time period of practical device operation. Scaling nanomagnet dimensions down to single-digit nanometers creates a fundamental challenge for dense magnet integration as the magnet's energy barriers reduces, and hence the nanomagnets become more vulnerable to thermal noise. While instability caused by thermal noise is typically a nuisance in magnetism, Dr. Camsari demonstrated with theory and proof-of-concept experiments that it can also be an opportunity. Specifically, the field of probabilistic computing with stochastic nanomagnets started in earnest with Dr. Camsari and colleagues [1] where they showed that the basic building block of a spin-orbit-torque magnetic random access memory (MRAM) device works as a tunable random generator (p-bit) in p-circuits of broad relevance to the fields of machine learning and quantum computing. Then Dr. Camsari lead a simpler p-bit design that modified the standard spin-transfer torque magnetic tunnel junction (MTJ) MRAM cell, whose MTJ contained an unstable free layer to realize the p-bit functionality [2]. This idea culminated in the experimental proof-of-concept of integer factorization using eight p-bits [3] in collaboration with the Fukami-Ohno group at Tohoku University. Dr. Camsari played a key leadership role in this collaboration. Subsequently, benchmarked SPICE and LLG simulations enabled him to lead the design of a scaled stochastic MRAM chip to emulate

quantum annealing by means of classical p-bits. This could lead to practical applications of spin-driven device in beyond CMOS computing [4], rivaling quantum computers implemented with superconducting flux qubits.

Dr. Camsari has published over 35 papers in refereed journals and conference proceedings including *Nature*, *Nature Electronics*, *Science Advances*, and *Physical Review X*. He has given over 15 invited talks in international conferences and workshops, including the American Physical Society (APS) March Meeting in 2016, the IEEE Device Research Conference in 2017, the Magnetism and Magnetic Materials Conference in 2017, the IEEE International Electron Devices Meeting in 2019 and the International Conference on VLSI Design in 2020. He has also served on the technical program committee for Design, Automation and Test in Europe Conference in 2020 and in 2021. More importantly, Dr. Camsari actively mentors graduate students, both from his group and other experimental groups, helping them understand and organize their observations into publication quality manuscripts.

[1] Kerem Yunus Camsari, Rafatul Faria, Brian M. Sutton, and Supriyo Datta, "Stochastic p-bits for Invertible Logic," *Phys. Rev. X*, 7, 03104, 2017.

[2] Kerem Yunus Camsari, Sayeef Salahuddin, and Supriyo Datta, "Implementing p-bits with Embedded MTJ," *IEEE Electron Device Letters*, 38, 1767-1770, 2017.

[3] William A. Borders, Ahmed Z. Pervaiz, Shunsuke Fukami, Kerem Y. Camsari, Hideo Ohno & Supriyo Datta, "Integer Factorization using Stochastic Magnetic Tunnel Junctions," *Nature*, 573, 390-393, 2019.

[4] Kerem Y. Camsari, Shuvro Chowdhury, Supriyo Datta, "Scalable Emulation of Sign-Problem - Free Hamiltonians with Room-Temperature p-bits," *Physical Review Applied*, 12, 034061, 2019.

Call for Papers for the Society's New Section in *IEEE Access*

By *Montserrat Rivas, Society Chief Open-Access Editor*

In response to its commitment to provide options to support the needs of all authors, the Society has introduced a new section devoted to magnetics within the open-access journal, *IEEE Access*. While the scope of *IEEE Access* is multidisciplinary, the Society's section focuses on theory and applications of magnetism, magnetic materials, and magnetic devices. It is fully open and compliant with all funder mandates. It will follow the Society's established standards of peer review, drawing on experts in magnetics to publish quality content in the field of magnetism.

A Society editorial board will drive the Society's commitment to publish high-quality articles, including cutting-edge studies and breakthroughs in magnetism. A six-week, rapid publishing schedule is targeted. All articles will be published under the CC-BY license, enabling authors to retain copyright.

Society members receive a 15% discount on article processing charges (APCs). For more information or to submit a paper, visit:

ieeemagnetics.org/index.php?option=com_content&view=article&id=310&Itemid=208

Be among the first to publish in the new Magnetism Society section in *IEEE Access*.

Korea Chapter News

By *Jongill Hong, Korea Chapter Chair*

While there were not many activities earlier in 2020, due to the global surge of COVID-19, the Society's Korea Chapter of the IEEE Magnetism Society was able to finally host all four 2020 Distinguished Lecturers for their lectures, through online presentations during these trying times. All lectures were successfully given in real time, in Fridays in September and October 2020.

It is worth mentioning that the number of attendees for these online lectures was much larger than typically seen for offline lectures, probably due to the convenience of an online lecture. The number of attendees joining online increased as the lecture series went on, and reached 56 for the final lecture - more than double that of any offline lectures in any previous year.

Many of the Chapter's members could not previously attend the lectures due to distance constraints. A traditional face-to-face lecture along with a live-streamed component seems a most effective way to deliver Distinguished Lectures. The Korea Chapter will adopt the combination of online and offline lectures in coming years.

Chicago Chapter News

Submitted by *Valentine Novosad, IEEE Chicago Section Advisory Chair*

The IEEE Magnetism Society Chapter plays a vital role in the activities of the 4,000+ members of the IEEE Chicago Section, under the leadership of Chapter Chair Pedram Khalili (Northwestern University), Secretary & WIE/WIS Chair Yuepeng Zhang (Argonne National Laboratory) and Treasurer and Young Professionals (YP) Chair Yi Li (Argonne National Laboratory).

The Chicago Chapter organizes and promotes magnetism-related activities across Greater Chicago. While 2020 certainly

was a very unusual year, we have managed to exploit the social-distancing challenge as an opportunity to broaden our reach and to re-engage with our members.

An excellent example is the 2nd Joint Annual Meeting of the IEEE Magnetics Society and IEEE Nanotechnology Council Chicago Chapters, held on 23 November 2020, in a virtual format. It convened local academic scholars, professionals, and students with broad interests in magnetics and nanotechnology. While the main goal of our annual event is to facilitate networking and collaboration, it also provides a unique forum for highlighting the latest advances in magnetic materials, nanomagnetism, and nanoelectronics.

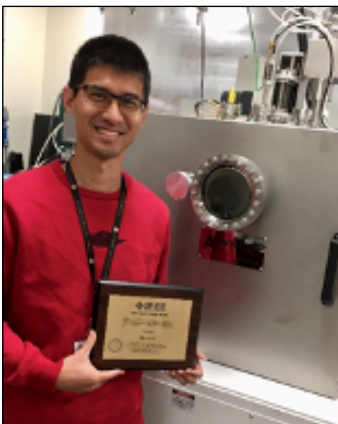
The level of excellence and diverse geography of our pool of invited speakers was truly remarkable, including four 2020 IEEE Distinguished Lecturers: Mathias Kläui (Johannes Gutenberg-University of Mainz, Germany); Tim Mewes (University of Alabama); Chengkuo Lee (National University of Singapore); and Oluwaseyi Balogun (Northwestern University); as well as other world-class experts in magnetism and/or nanoscience, including Andrei Slavin (Oakland University); Martin Holt (Argonne National Laboratory), and Vinod Sangwan, Hanu Arava, and Pallab Goswami (each at Northwestern University).

There was a poster session organized during the meeting. Two best poster presentation prizes were awarded Zedong Hu (Northwestern University) and Saima Siddiqui (University of Illinois at Urbana-Champaign).

The meeting was co-chaired by Charudatta Phatak (Argonne National Laboratory), the Chair of local IEEE Nanotechnology Council Chapter; and Pedram Khalili (Northwestern University) our Society Chapter chair.

Overall, the 2nd Joint Annual Meeting of the IEEE Magnetics Society and IEEE Nanotechnology Council Chicago Chapters was a great success and the leadership of both Chapters decided to hold similar event in the fall of 2021.

Our Chapter congratulates our Treasurer and YP Chair Yi Li (pictured), recipient of the 2020 Distinguished R&D Award from the IEEE Chicago Section, with the citation "*in recognition and appreciation of his pioneering work on magnon-photon coupling in superconducting resonators for quantum information science.*" The Award was formally presented at the award ceremony organized during the 2020 IEEE Chicago Annual Expo & Fair, held in a virtual format.



New Senior Members

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

November 2020: Goran Karapetrov, Subhra Paul, Jose Vargas and Daniel Worledge.

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

IEEE Magnetics Society at the IEEE International Conference on Nanomaterials: Applications & Properties (NAP 2020)

Submitted by Valentine Novosad, IEEE NAP 2020 Conference General Co-Chair

The IEEE NAP conference is an international event held annually in Ukraine since 2011. The prime focus is on nanoscale materials with emphasis on interdisciplinary research, exploring and exploiting the unique physical and chemical properties of these materials for practical applications.

For the last three years, the IEEE NAP conference was co-organized by Sumy State University and the IEEE Nanotechnology Council, with endorsements and support from the International Union for Pure and Applied Physics and the IEEE Magnetics Society.

Owing to the active involvement of the IEEE Magnetics Society members in the Organizing Committee, the magnetics-related topics are traditionally well-represented, and the 2020 conference was no exception. Relevant topics were presented during the plenary session, and three dedicated oral and one poster session.

IEEE NAP 2020 was held in virtual format during 9-13 November 2020 and had 245 attendees (125 from Ukraine and 120 from 31 other countries), including 47 students. In total, the IEEE NAP2020 participants delivered four plenary, three keynote, 26 invited, and 75 contributed oral presentations, as well as over 100 e-poster presentations. During the conference, the Organizing Committee selected the winners of the "Rising Star in Nanoscience & Nanotechnology" Best Presentation Award competition, in oral and poster categories. In total, over 15 Award Certificates and Award Plaques were mailed to our students, the winners of this competition.

The IEEE Magnetics Society was promoted actively while preparing and running the conference: online, via our Facebook page and conference website, in emails to the attendees, as well

as during the opening/closing ceremony and different technical sessions of the conference. Furthermore, Atsufumi Hirohata (University of York, UK), our Society's past Secretary - Treasurer, delivered a special highlight talk "IEEE Magnetics Society," during our "Sponsors in the Spotlight" focus session. With the support from our sponsors, including the IEEE Magnetics Society, the organizers were able to waive the conference registration fees of 27 PhD and undergrad students.

Almost 140 proceeding manuscripts were peer-reviewed and are already published online in the IEEE Xplore Digital Library, indexed by all major scientific databases. Thus, it is not surprising that during the last three years, largely thanks to the IEEE NAP conference and IEEE Magnetics Society partnership, the number of our local members has increased almost three times!

Preparations are underway for the 2021 11th IEEE International Conference on "Nanomaterials: Applications & Properties", to be held in Odessa, Ukraine, during 5-11 September 2021. Invited-speaker nominations are being solicited via email: info@nap.sumdu.edu.ua. Nominations of female speakers, young talent, and underrepresented groups are especially encouraged and given the highest priorities.

To find more about the conference, visit our website (nap.sumdu.edu.ua) and follow us on Facebook (www.facebook.com/nap.conference). We welcome all of you to present your work and join us in Odessa during 5-11 September 2021, and, finally, after a year of almost exclusive virtual meetings, to experience the beauty and spirit of a real "physical" conference again!

IEEE Student Membership Discount

By Ron Goldfarb, Magnetics Society Secretary-Treasurer

The IEEE Board of Directors has approved a discount of 50% on student member dues. Students may use the promotion code FUTURE50 during the **online check-out process** for joining or renewing their IEEE memberships. Students who recently joined or renewed at full price may write to the **IEEE Contact Center** to request a credit on future membership dues.

INTERMAG 2021

By Bernard Dieny, INTERMAG 2021 General Chair

The IEEE International Magnetics Conference (INTERMAG2021) will be held as a virtual conference, during 26-30 April 2021. INTERMAG covers all aspects of applied magnetism ranging from fundamental to applied aspects, including spintronics, magnetic recording, magnetic memory, sensors, bio-

magnetism, energy and power technologies, electrical machines, power electronics and electric drives, as well as the emerging fields of Internet-of-Things and smart living. It will provide a series of oral and poster presentations, invited talks and symposia, a tutorial session, exhibits and will embed the 12th MRAM Global Innovation Forum.

Conference-related papers will be published in *IEEE Transactions on Magnetics* upon peer review. With very attractive registration fees, over 1500 participants are expected.

12th MRAM Global Innovation Forum

By Bernard Dieny, INTERMAG 2021 General Chair

The 12th MRAM Global Innovation Forum will take place virtually on the first day of the INTERMAG 2021 conference, on 26 April 2021. It will comprise ten invited talks which will be made available on-demand one week before the Forum, a live Q&A session as well as a live panel discussion on "What do we need to bring MRAM to next level?".

The program will include invited presentations (available on-demand) and live Q&A and will be chaired by Kevin Garello (Spintec):

MRAM physics, materials and process integration:

- Tiffany Santos (Western Digital)
- Sahil Patel (Applied Materials)

MRAM product development:

- Dimitri Houssamedine (IBM)
- Jeong-Heon Park (Samsung)
- Johannes Muller (Global Foundries)
- Yan-Jen Lee (TSMC)

Design-technology interaction:

- Shinobu Fujita (Kioxia)
- Jack Guedj (Numem)

Beyond STT-MRAM:

- Shunsuke Fukami (Tohoku university)
- Manu Perumkunnil (IMEC)

Panel discussion: What do we need to bring MRAM to next level?

Moderated by Luc Thomas (Applied Materials)

- Simone Bertolazzi (Yole)
- Gouri Sankar Kar (IMEC)
- Daniel Worledge (IBM)
- Seung Kang (Qualcomm)

• KoMin Chang (NXP Semiconductor)

Conference Calendar

By **Gareth Hatch**, Newsletter Editor

Please check the conference Web sites shown below for the latest information on COVID-19-related schedule or format changes.

Materials Challenges for Memory

11-13 April 2021 - online.

INTERMAG 2021

26-30 April 2021 - online.

26th International Workshop on Rare Earth and Future Permanent Magnets and their Applications (REPM2021)

7-10 June 2021 - online.

Advances in Magnetism 2020/2021 (AIM 2020/2021)

13-16 June 2021 - online.

16th European Conference Physics of Magnetism (PM'21)

28 June - 2 July 2021 - online.

European School on Magnetism 2021 (SMM25)

13-16 September 2021 - Grenoble, France.

25th Soft Magnetic Materials Conference (ESM 2021)

6-17 September 2021 - Cluj-Napoca, Romania.

Magnetic Frontiers 2021: Quantum Technology

28 September - 1 October 2021 - New York, New York, USA.

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

Request for Cover Image Submissions

By **Gareth Hatch**, Newsletter Editor

Each edition of the Newsletter features images from the art-related competitions at the INTERMAG and MMM conferences, and from elsewhere. I continue to invite image submissions directly from IEEE Magnetics Society members, to potentially feature on the cover of future editions.

Please send your high-resolution image submissions to me at **g.p.hatch@ieee.org** with a caption or title for the image, a brief technical description, the name of the creator of the image, and their organization or affiliation.

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 magnetism.

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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