Special Issue of Proceedings of the IEEE Highlights Advances in Spintronics

Proceedings of the IEEE announces the publication of a special issue covering advances in spintronics. The special issue highlights spintronics technology breakthroughs in a new generation of electronic devices.

Piscataway, NJ (PRWEB) November 01, 2016 -- Proceedings of the IEEE, the most highly cited general-interest journal in electrical engineering and computer science, announces the publication of a special issue covering advances in spintronics.

“Over the last 10 years, there has been tremendous progress in commercially important areas of spintronics, including semiconductor-spintronic-based quantum computing and metal-based spintronics and sensors,” said Hideo Ohno, one of the guest editors for the special issue, and Director of Research Institute of Electrical Communication, Director of Center for Spintronics Integrated System, Director of Spintronics Research Network, all at Tohoku University. “While these areas will continue to be of great importance for further advancing the field, we expect to see emphasis shift to more of the applied aspects of spintronics.”

The special issue, which contains 12 papers, also highlights a number of technologies that may improve sensors and magnetic memories or develop into other devices such as three-terminal devices based on different aspects of spin-transfer torques (STT), spin-torque nano-oscillators, devices controlled by electric fields rather than currents, and devices based on magnetic skyrmions. Even further in the future, spintronics-based applications may be used in energy harvesting, bioinspired computing, and quantum technologies.

“While the role of magnetic sensors will continue to remain important, magnetic random access memories (MRAMs) will play an increasing role both as standalone memory and embedded in a CMOS computer chip,” said Ohno. “We expect that STT-MRAM (Spin-Transfer Torque-MRAM) will also become a major storage technology because of its ability to scale well.”

STT-MRAM leverages existing CMOS manufacturing techniques and can retain its data indefinitely, even when the power is lost or off. In addition to consuming low power and the low cost of flash memory, STT-MRAM is expected to play an important role in areas such as the Internet of Things (IoT), ultra low-power electronics, and high-performance computing (HPC).

The other guest editors of the special issue include Mark D. Stiles, Fellow in the Center for Nanoscale Science and Technology (CNST) at National Institute of Standards and Technology (NIST), and Bernard Dieny, Chief Scientist at SPINTEC, a government laboratory he co-founded in Grenoble, France devoted to spin electronics.

Other topics covered in the special issue include:

* Modern digital data storage, particularly hard disk drives and the role played by two breeds of spintronics sensors that replaced conventional sensors utilizing anisotropic magnetoresistance (AMR).
* Spintronic-based nonvolatile memories used in conjunction with CMOS-based logic applications.
* Security issues in spintronic devices.
* Spintronic sensors and the range of applications from industrial to biosensor and biomedical.
* Spin caloritronics (the study of combined heat and spin flow).
* Low energy magnetization reversal for low-power electronics and spintronics.
* Spintronic nanodevices for bioinspired architectures.
* Creating, transporting and manipulating skyrmions and the advantages of skyrmion devices.

To learn more about the special issue on Spintronics, please visit the Proceedings of the IEEE’s website, LinkedIn or Facebook page.

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