RF applications based on spintronics: latest results and future developments

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Spintronics consists of manipulating electronic spins rather than, or in addition to, charges through electrical currents and/or magnetic fields. This technology has revolutionized the market of read-head applications and other types of magnetic sensors. Spintronics is considered one of the most serious candidates for Beyond CMOS technology. This opinion is supported worldwide as stated by the ITRS 2.0 roadmap[1] or by a recent article from Intel[2]. Spintronics can create the basis for a new generation of applications permitting EU semiconductor Industry to renovate, opening a new era of growth and market competitiveness. Recently, the attention is on a new generation of magnetic non-volatile memories (STT-MRAM) that will be soon commercialized by SAMSUNG and IBM[3]. Furthermore, magnetic sensors, radio-frequency (rf) and logic devices are other promising paths for spintronic-based applications. Here I will present some of the recent works done in the "Unité Mixte de Physique CNRS/Thales" concerning spintronics and magnonics. I will focus on future RF applications based on spin-transfer torque oscillators (STNOs) like emitters, frequency detectors and neuromorphic architectures based on the synchronization of STNO arrays. Furthermore, I will present some results on RF devices based on spin-wave computing (filtering, oscillators, non-reciprocal devices, etc.) with YIG thin films.

In the second part of the talk I will present the SpinTronicFactory network, founded in 2016, with mission to promote research and innovation in Europe based on spintronics. It is based on a legal Memorandum of Understanding involving academic and industrial actors all across Europe. More details in the website: http://spintronicfactory.eu/

References:

[1] http://www.itrs2.net/itrs-reports.html

[2] https://www.technologyreview.com/s/600716/intel-chips-will-have-to-sacrifice-speed-gains-for-energy-savings/

[3] Samsung announced that they will commercialise STT-RAM in 2017 and IBM researchers, in collaboration with Samsung, demonstrated switching STT-RAM cells for devices with diameters ranging from 50 down to 11 nanometers in only 10 nanoseconds.