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Introduction

The fourth edition of the Spintronics symposium of the SPIE conference gathered more than sixty invited speakers in San Diego from Sunday 21st to Wednesday 24th August 2011.

As for the previous editions, the symposium covered the main topics of Spintronics, and witnessed for the dynamism of this very active field of research. These proceedings report some important results presented at the meeting.

The fourteen sessions were entitled: Spin coherence, Spin injection (two sessions), Magnetism (two sessions), Quantum Dots (two sessions), Multiferroics and Graphene (two sessions), MgO barriers, Spin currents and Spin-orbit coupling, Spin transfer (two sessions), Organic materials, and Spin and Photonics.

Some general trends in Spintronics during the last decades have been confirmed during the symposium. The fascination about Spin Hall and topological insulators can be seen from the paper by *Sonin*, and the importance of the spin-coherence in spintronic devices is confirmed from the systematic observation of spin Hall effects in lateral geometry, and from the progresses performed in optical spin-injection and detection experiments (see papers by *Giovanni et al*, *Amand et al*, *Taniyama et al*, and *Hirmer et al*). On the other hand, nanomagnetism is still a reservoir of stimulating surprises, as shown by the discussions about frustrated systems, magnonics (see paper by *Grundler*) and magnetic inertia (see paper by *Wegrowe et al*), and with the developments of new investigation tools (see papers by *Oka et al* and by *de Groot et al*). Quantum Dots are a source of well-controlled spin engineering with an important role of nuclear spins (see *Amand et al* and *Tifrea*), single electron transistors (see *Valenzuela et al*), single spin effects (see *Pryor*). For the point of view of the developments of new materials for spintronics, graphene and multiferroics are still very promising materials for new applications (see the papers by *Dowben et al*, and by *Dery*), and organic materials (see *Johnston-Halperin*). The MgO barrier (already integrated in industrial magnetic RAM units) is still the subject of intensive investigations (see the papers by *Kelber* and by *Weber et al*). The study related to spin-orbit coupling, spin currents, and resonant spin amplification are also the source of intensive efforts and important progresses are on-going (see *Bottegoni et al*, *Flatté et al*, and *Griesbek et al*). On the other hand, spin transfer studies are still enlarging their application domains with the development of spin-transfer vortex oscillators (see *Baraduc et al* and *Buergler et al*), and other systems (see *Deac* and *Claudio-Gonzales et al*).

Overall, the conference was an invaluable opportunity for open exchange and stimulating discussions in a friendly atmosphere.

We are grateful to SPIE, to the program committee, and to all speakers and authors that have made this conference a success.

Jean-Eric Wegrowe
Henri-Jean Drouhin
Manijeh Razeghi