

Session D: Semiconductor Spintronics

Wednesday, July 06, 2016 | 16:30 - 18:00 | 309

Chairs: Minn-Tsong LIN

D-1 30 min ICEM16-A-0085 [Invited](#)

Silicon Spintronics

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Although all-electrical spin injection and propagation at room temperature in silicon has been claimed, the larger than predicted signal obtained with the established three-terminal method is under intense discussion. The weak spin-orbit interaction makes the all-electrical spin manipulation in silicon inefficient. However, an efficient coupling between the electrical and the magnetic degrees of freedom is achieved at the quantum-mechanical level in magnetic tunnel junctions. Magnetic memory cells with all-electrical switching, in particular spin-transfer torque magnetic random access memory (STT-MRAM), are viable candidates for future fast, non-volatile, and CMOS-compatible universal memory. A composite structure of the recording layer helps reducing the critical current density without compromising the thermal stability in in-plane MRAM. In addition, STT-MRAM enables an intrinsic logic-in-memory architecture, where the same elements are used to store and to process information. A non-volatile magnetic flip flop can be incorporated into a functionally complete and fully non-volatile spintronic computing environment.