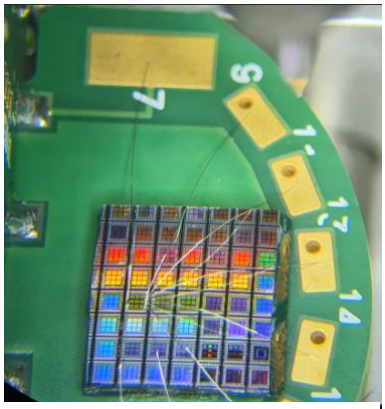
Spintronics: fundamental, applied, industrial

Andrey Timopheev

Crocus Technology, Grenoble, France



Cutout from 8-inch RnD wafer with different TMR sensors directly bonded to PCB.

For two last decades, spintronics has passed through all three stages of human knowledge development: fundamental studies on basic spintronic phenomena, applied research on tunnelling (TMR) and giant magneto-resistive (GMR) devices and, finally, industrial-wise R&D work with further commercialization of TMR in the field of spin-transfer-torque memory (STT-MRAM) and TMR magnetic field sensors. More yet to come with the state-of-the-art TMR technology being applied to neuromorphic computing, spin-orbit-torque memory (SOT-MRAM) and microwaves generation using spin-torque nano-oscillators (STNO). Even more to be done in the field of 2D materials, topological insulators and antiferromagnetic spintronics.
In this talk I would like to cover three topics which naturally fall into these three stages of development and represent my contribution to the field of spintronics:

- Dynamic exchange by spin currents in GMR multilayers induced by ferromagnetic resonance.
- Second order anisotropy in perpendicular magnetic tunnel junctions and its positive impact on switching time of STT-MRAM cell.
- Exchange stiffness modification in Permalloy doped with Tantalum and consequences for vortex based TMR sensor performance.

1. B. Dieny *et al.* Nature Electronics **3**, 446 (2020).
2. V. Baltz *et al.* Rev. Mod. Phys. **90** (2018).
3. Y. Tokura *et al.* Nat. Rev. Phys. **1**, 126–143 (2019).

02.04.2024 at 10:00

Josef-Stefan Lecture Hall, Boltzmanngasse 5, 3rd floor, 1090 Wien