**Spintronics towards novel magnetic devices**

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Spintronics, sometimes referred to as spin electronics, is an emerging research field which studies the spins of conduction electrons and their interaction with magnetic moments in magnetic materials. Since magnetic moments can be manipulated by electric currents via various spintronic mechanisms, this feature combined with the non-volatility of magnetic information has led to a variety of novel concepts of magnetic memory and logic devices [1,2] that promise very high-density data storage, fast operation time and low-power consumption.

In this talk, we will review our research works that have been performed associated with the development of novel spintronic devices such as the magnetic domain wall racetrack memory and the magnetic random access memory. This talk also deals with a brief introduction to spintronics and magnetic phenomena where interesting underlying physics involved, for example, interfacial Dzyaloshinskii-Moriya interaction [3], spin-transfer or -orbit torques [4], topological effects [5,6], etc. In the end, future research plans including collaboration plan for convergence research will be discussed.

References

[1] S. S. P. Parkin, *et al*., *Science* **320**, 190 (2008).

[2] I. M. Miron, *et al*., *Nature* **476**, 189 (2011).

[3] S.-G. Je, *et al*., *Phys. Rev. B* **88**, 214401 (2013).

[4] S.-G. Je, *et al*., *Phys. Rev. Lett.* **118**, 167205 (2017).

[5] S.-G. Je, *et al*., *Nano Lett.* **18**, 7362-7371 (2018).

[6] S.-G. Je, *et al*., *Nature Phys.* Submitted.