

Potentials and issues of Magnetic Random Access Memory

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MRAM (Magnetic Random Access Memory) is believed to have potentials to become an ultimate non-volatile random access memory, because magnetic materials have been proved to have non-limited endurance in HDD (Hard Disk Drive) systems. So far, lots of efforts have been made and resulted in successful demonstrations [1], [2], [3].

However the density of other memories is getting larger and larger. MRAM has to keep up with the density trend in order to be competitive in cost. Further, the speed of the density growth is very fast like an express train. Here arise questions, not only whether MRAM's technological issues can be overcome, but also whether it can be solved quickly enough to catch the express train. Fortunately, materials used in MRAM have been almost already developed in HDD field and the skilled engineers and researchers are focusing on this technology, "spintronics". This helps a lot. This is a big advantage of MRAM compared with other new emerging memories. This is one of the big reasons why I, myself, am a believer of MRAM.

It is true that MRAM is not a future memory but there is still a remaining challenging issue, scaling. Large programming current and small signal are the main two problems. Several solution candidates have been reported [4], [5], [6]. In this talk, at first potentials of MRAM are reviewed, and then the scaling is discussed including its solution candidates, yoke-wire and double magnetic tunnelling junction.

References

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