

Abstract of Presentation

Presentation Title:

Spin-transfer related phenomena in magnetic tunnel junctions

- Interplay of the giant tunneling magneto-resistance and spin-torque effect -

Abstract :

Spin-injection magnetization switching (SIMS) technique [1-2] made it possible to control magnetization by direct current. Observations of rf oscillation from CPP-GMR nano-pillars [3] and a real time observation of the switching process [4] have revealed essential amplification function of a precession in the magnetic nano-pillars under a direct current. Beside of those progresses, developments of giant tunneling magneto-resistive (GTMR) effect using an MgO barrier [5-10] made it possible to utilize a very large resistance change according to the magnetization switching. Here, we propose to use interplay between a current controlled magnetization dynamics and a magnetization dependent electric resistance to obtain new functions of the magnetic nano-pillars. In this talk, our several attempts [11-13] to utilize interplay between spin-torque and TMR effect will be introduced referring to a negative resistance effect and signal amplification using magnetic tunnel junctions (MTJs). At the end of the talk, newly developed technoque to control magnetization by voltage [14] will be introduced.

The experiments were mainly done by H. Maehara of Canon ANELVA, in collaboration with H. Kubota, A. Fukushima, S. Yuasa of AIST, and T. Nozaki, Konishi, and A. Deac of Osaka University, and K. Tsunekawa, D. D. Djayaprawira, and N. Watanabe of Canon ANELVA. Parts of this study was supported by New Energy and Industrial Technology Development Organization (NEDO), G-COE program of MEXT, and SCOPE of MIC.

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