SPIN TRANSFER TORQUE IN CPP NANO-PILLARS FABRICATED USING 3D-GALLIUM FOCUSED ION BEAM MILLING

A. Aziz[1], M.C. Wu[1], M.G. Blamire[1], M.C. Hickey[2], M. Ali[2], C.H. Marrows[2], B.J. Hickey[2]

[1]*Dept. of Materials Science & Metallurgy, Univ. of Cambridge, Cambridge CB2 3QZ, UK*
[2]*School of Physics and Astronomy, University of Leeds, Leeds LS2 9JT, UK*

Spin torque transfer (STT) phenomenon [1] provides a novel route for switching free magnetic layer in a spin valve without any requirement of an external magnetic field. High current densities, which are essential for switching magnetisation direction of free layer, are achieved by fabricating nano-pillars or point contact devices. Since contact area can not accurately be controlled, point contact devices tend not to give very reliable results. Devices fabricated using E-beam lithography are much more reliable, but the fabrication process is very lengthy and difficult. We will present an alternative technique for fabricating CPP (current perpendicular to plane) nano-pillars using 3D gallium focused ion beam (FIB) milling. This technique provides a very reliable one stage milling process for fabricating CPP devices. Robustness of this process makes it very useful for studying spin torque transfer devices. Using 3D-FIB processing, nano-pillars of diameter down to 100 nm have successfully been fabricated (see FIG. 1). In this talk I will present the spin torque transfer switching in CPP spin valve devices and highlight the benefits of using FIB for fabricating CPP devices.

[1] J. C. Slonczewski, J. Magn. Magn. Mater. **159**, L1 (1996).

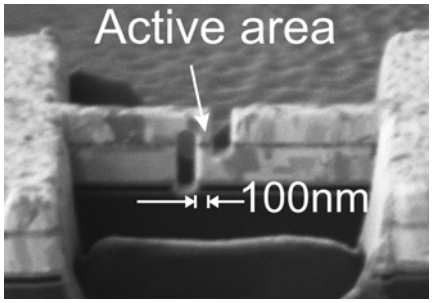

Fig. 1: Micrograph of a typical CPP device fabricated using Ga-FIB milling. Spin valve is at the active area where current flow perpendicular to the plane.