

Exotic application of FIB : magneto-resistive sensor modification

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Abstract

We report here on FIB modification of commercial magneto-resistive sensors. It has been verified that ion beam does not affect physical property sensor which allows magnetic field measurements.

Purpose of the sensor modification

Among commercial magnetic sensors, Giant Magneto-resistive one seems a good compromise between size and magnetic resolution

Principle	Optimal magnetic resolution	Optimal spatial resolution	Drawbacks
High variation in sensor material resistance (20-100%)	1nT	1 μ m	Low spatial resolution for commercial sensor

Typical GMR microstructure

Permalloy thickness ~ 1nm



Sensor optical image : active area is 25 μ m wide and 200 μ m long



25 μ m

Detail of active area

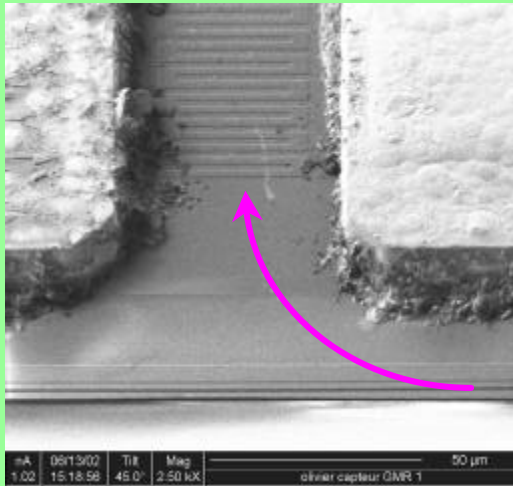


Spatial resolution depends on sensor size



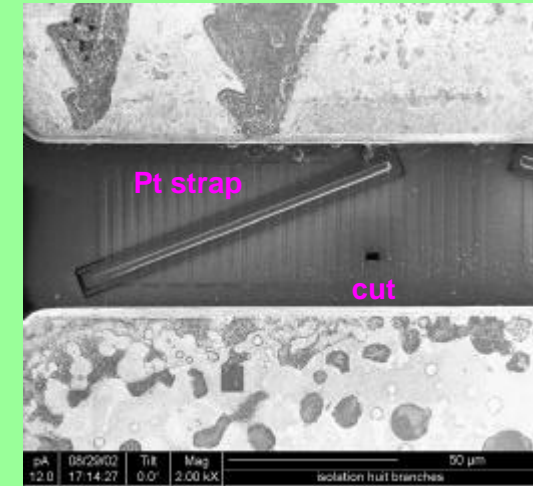
Reduce the sensor size by FIB modification

Sensor FIB modification



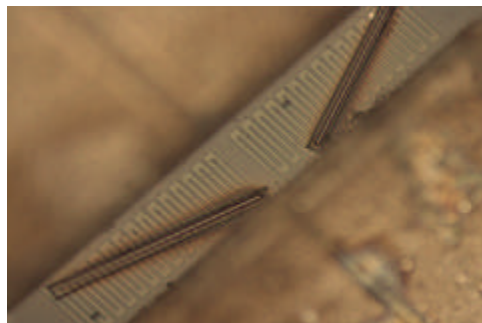
The size of the GMR coil is reduced through :

- cuts
- platinum straps



Both coils have been reduced in size.

Electrical and magnetic measurements have confirmed the preserved GMR property of the sensor



Conclusion

FIB allows to modify successfully GMR devices. Further experiments are under progress to improve the spatial resolution of GMR magnetic sensors.