Local reversal of exchange anisotropy using laser annealing in patterned NiFe/FeMn films

S. W. Kim[2], S. D. Choi[2], S. S. Lee[1], and D. G. Hwang*[1]

[1] Sangji Univ., Dept. of Computer and Electronic Physics, Wonju 220-702, Korea
[2] Dankook Univ. Dept. of Physics, Cheonan 330-714, Korea

*Corresponding author: e-mail: dghwang@sangji.ac.kr, Phone: +82 33 730 0413, Fax: +82 33 730 0403

In recent years, the current controlled magnetization reversal due to the movement of domain wall and spin transfer in magnetic thin films has been very active [1]. The basic structure for assigning a magnetic memory device and sensors using domain wall motion is a free ferromagnetic element at the center and two pinned ferromagnetic elements of opposite anisotropy on both sides. An external current can control the magnetization reversal of a free ferromagnetic element. To locally reverse a unidirectional anisotropy in the strip and ellipsoidal patterned Ta/NiFe/FeMn/Ta multilayers fabricated by ion-beam deposition, the laser annealing method was used. The films were exposed to the emission of the DPSS (Diode Pumped Solid State, Nd:YAG) laser operating at a wavelength of 532 nm during 15 min under the applied field of 600 gauss. The intensity was increased up to 440 mW. The structure and magnetic properties were analyzed by magnetoresistance curve, XRD, VSM, and MFM. As the power of laser annealing increased, the intensity of MR peak located in + 87 Oe shrunk. A new MR peak was generated at − 63 Oe due to local laser annealing of 200 mW. As the exposed area expanded, the intensity of the new MR peak increased. This proved that the local reversal of exchange biasing could be realized by laser annealing. And the dependence of expose time and strip pattern size (10 – 200 μm) was studied, and the magnetic domain structure of the exposed region and the boundary of opposite exchange will be showed.
End of abstract.

References

[1] E. B. Myers et et al. Science 285, (1995), p.867.