

PROPERTIES OF ATOMIC LAYER DEPOSITED IRON AND BISMUTH OXIDE LAYERED STRUCTURES

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Materials that show multiferroic like behaviour are of interest due to their attractive magnetic and electric properties suitable for nanoelectronics and spintronics [1,2].

In connection with the demand for novel materials, two-layer structures consisting of Fe_2O_3 and Bi_2O_3 thin film layers were constructed in this study. The films were grown by atomic layer deposition at 375 °C from FeCl_3 , BiCl_3 and H_2O . Selected samples were annealed in the air environment at 800 °C to determine the effect of heat-treatment on magnetic and structural properties.

Films were crystalline in the as-deposited state. The performance of the two-layer structures was dependent on the thicknesses of the constituent oxide layers. The magnetization in these films was nonlinear, saturative, and with moderate, but still well defined coercive fields (Fig. 1). Annealing, however, drastically changed the morphology and reduced the magnetic properties of thin films (Fig. 1).

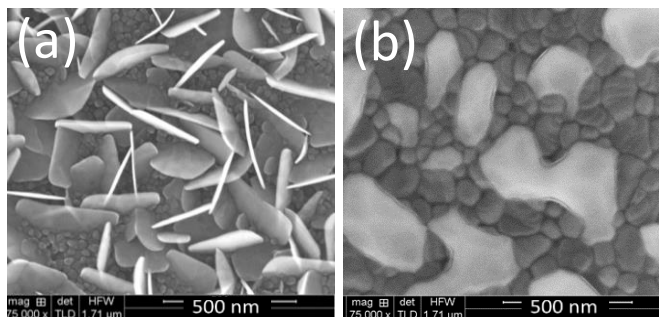
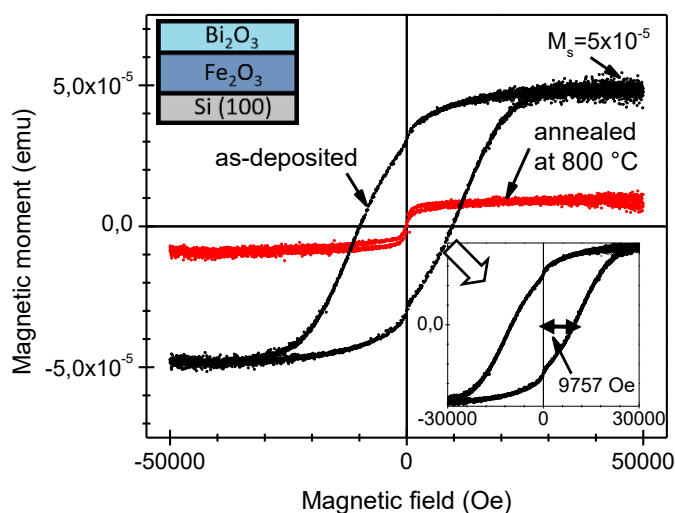


Fig. 1. Magnetic moment vs. external magnetic field curves at 300 K for the as-deposited (black) and annealed (red) 30.9 nm Fe_2O_3 + 14.5 nm Bi_2O_3 two-layer object and the bird-eye view of the scanning electron microscope images of the same objects in the as-deposited (a) and annealed (b) form.

References

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