

The Influence of an External Magnetic Field on the Stripe Domains in Epitaxial YIG Films Studied by Force Gradient Microscopy

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Epitaxial yttrium-iron-garnet films (YIG) have a set of structural and magnetic properties, which enables their application as an active medium of electronic devices. Epitaxial YIG structures are used in microwave technology devices, planar waveguide structures and lasers, magneto-optical devices and sensors of visual magnetometry.

The aim of our research was to study the distribution of magnetic domains on the surface of the YIG films with different thicknesses in the external magnetic field. The study was carried out using a scanning probe microscope “NanoScope IIIa Dimension 3000” using the methods of the magnetic field gradient measurements.

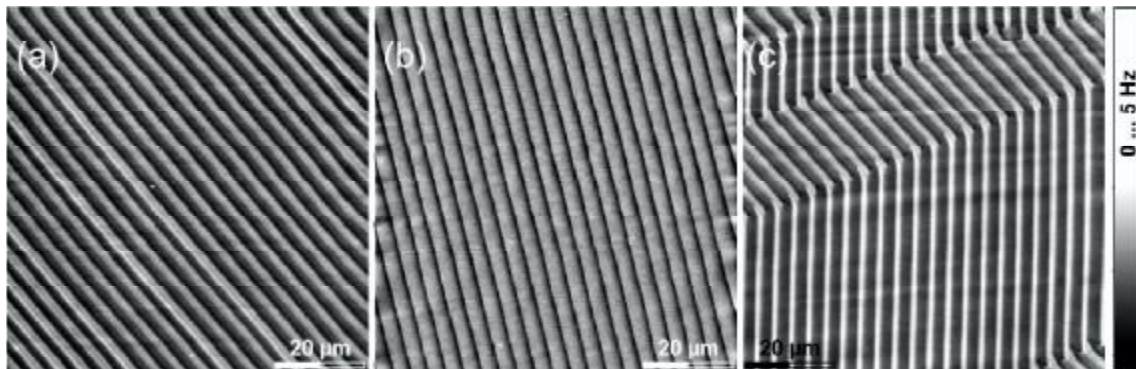


Fig.1. MFM images of the same area on the 2.9 μm YIG film scanned before (a) under (b) and after (c) application of external magnetic field of 4 mT. Field applied along horizontal direction.

We observed the stripe domain structure in YIG films with thickness 2.9 μm and 5.11 μm in external magnetic field of 2-10 mT. It was found that in the external magnetic field stripe domains in YIG film thickness of 2.9 μm expanding, which is not observed in the film thickness of 5.11 μm . Also there are bends or alignment of domain structure.

These results are important for understanding the physics of the processes occurring in thin films of YIG.