

Contribution submission to the conference Dresden 2009

Synthesis and characterization of Permalloy thin films prepared by DC-magnetron sputtering — ●SALEH GETLAWI¹, FRANK MÜLLER¹, MICHAEL WICK¹, MICHAEL R. KOBLISCHKA¹, STEFAN HÜFNER¹, JÖRG SCHMAUCH², VASSIL SKUMRYEV³, and UWE HARTMANN¹ — ¹Experimental Physics, Saarland University, Campus C 6 3, D-66123 Saarbrücken, Germany — ²Technical Physics, Saarland University, Campus D2 2, D-66123 Saarbrücken, Germany — ³Departament de Física, Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain

Recently, the interest in permalloy ($\text{Ni}_{81}\text{Fe}_{19}$; Py) thin films has again increased. This is mainly due to their utilization in integrated thin layers, magnetic heads and in small-size magnetic sensor and memory applications. Several fabrication methods such as vacuum evaporation, electroplating, and most recently, sputtering have been employed for the preparation of Py thin films. Here, we report on the preparation of Py thin films by means of DC sputtering, and perform a thorough analysis of the resulting thin film samples. XPS depth profiling experiments were performed in detail, resulting in a Ni:Fe ratio close to the nominal value. The Py films exhibit nearly no oxygen inclusion, and C impurities are in the range of about 5% throughout the film. The grain size of the films was examined by TEM. The magnetic characterization of the Py films was performed by means of SQUID and magnetoresistive measurements including Hall effect analysis. The magnetic domain structures on lithography patterned samples were investigated in detail by magnetic force microscopy.

Part: MA
Type: Vortrag;Talk
Topic: Magnetische Dünne Schichten;Magnetic Thin Films
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