SEMINARIUM Z MAGNETYZMU I NADPRZEWODNICTWA

Uprzejmie zawiadamiamy, że w **PONIEDZIAŁEK**

13 maja 2013 r., w sali 203 odbędzie się seminarium, na którym

o godz. 12:00

Prof. Rudolf Schaefer

Leibniz Institute for Solid State and Materials Research (IFW), Dresden, Germany

IEEE 2013 Distinguished Lecturer

wygłosi referat na temat:

Magneto-Optic Analysis of Magnetic Microstructures

The rich world of magnetic microstructure or magnetic domains, extending from visible dimensions down to the nano-scale, forms the mesoscopic link between the fundamental physical properties of a magnetic material and its macroscopic properties and technical applications, which range from films for computer storage technology to magnetic cores for electrical machinery. Hysteresis phenomena, energy loss in inductive devices, noise in sensors, or the magnetoresistive properties of modern spintronic devices can be decisively determined by the peculiarities of the underlying magnetic microstructure, especially by irreversibilities in the magnetization process. Therefore any development and optimization of magnetic materials, which is usually accompanied by the measurement of magnetization curves, requires an understanding of the underlying domains and their reaction to magnetic fields, which, in most cases, can only be gained by direct imaging.
The presentation will address different aspects of magnetic microstructure adapted, where possible, to the interest of the audience and supported by domain observation using Kerr microscopy. This may include domains and magnetization processes in bulk magnetic material like oriented and non-oriented electrical steel, amorphous and nanocrystalline ribbons or permanent magnets, as well as thin films and multilayers. Fast magnetization processes can also be considered. Most challenging is the analysis of hidden (internal) domains and processes in bulk material. They are relevant for material performance and their analysis requires surface imaging in combination with domain modeling and some volume-sensitive imaging method. Aside from their scientific and technical relevance, magnetic microstructures are also aesthetically appealing, an aspect that will be part of the presentation.

o godz. 13:00

Prof. Adekunle Adeyeye

Department of Electrical & Computer Engineering, National University of Singapore

IEEE 2013 Distinguished Lecturer

wygłosi referat na temat:

Artificial Ferromagnetic Nanostructures: An Experimental Platform for Magnonics

Artificial ferromagnetic nanostructures with periodic lateral contrasts in magnetization are known as “magnonic crystals” (MCs), conceived as the magnetic analogue of photonic crystals. Recently, there is growing interest in

the fundamental understanding of the spin wave propagation in MCs because of their huge potential in a wide range of applications such as microwave resonators, filters and spin wave logic devices. With advances in controlled nanofabrication techniques, it is now possible to synthesize high-quality periodic bi-component magnetic nanostructures with precisely controlled dimensions. The band spectrum of MCs consists of allowed states magnonic bands and forbidden states (magnonic gaps) that can be tuned by magnetic fields or geometrical parameters. We have shown that MCs represent a perfect system for studying excitations on disordered periodical lattices because of the possibility of controlled variation in the degree of disorder by varying the applied magnetic field [1]. We have also demonstrated functionality of magnetic logic based on a reconfigurable MC in the form of a meander-type ferromagnetic nanowire [2]. A ferromagnetic resonance method employing a microscopic coplanar waveguide was used to detect the logic state of the structure coded in its magnetic ground state.

This talk will be divided into 3 parts: the first part will focus on strategies we have developed for synthesizing high-quality 1-D and 2-D MCs using deep ultra-violet lithography technique at 248 nm exposure wavelength. Using resolution enhancement techniques, we have fabricated arrays of ferromagnetic nanostructures with lateral dimensions and inter-element spacing below the conventional resolution limit of optical lithography tools. The second part will focus on results of our recent systematic investigation of both the static and dynamic properties of MCs using a combination of magneto-optical Kerr effect measurements, magnetic force microscopy, broadband ferromagnetic resonance spectroscopy, magneto transport measurements and micromagnetic simulations. In the third part, the concept of binary magnetic nanostructures will be introduced and their potential application in magnetic logic devices demonstrated.

[1] J. Ding, M. Kostylev, and A. O. Adeyeye, Physical Review Letters 107, 047205 (2011).
[2] J. Ding, M. Kostylev, and A. O. Adeyeye, Applied Physics Letters 100, 062401 (2012).

Serdecznie zapraszamy

Roman Puźniak
Henryk Szymczak
Andrzej Wiśniewski