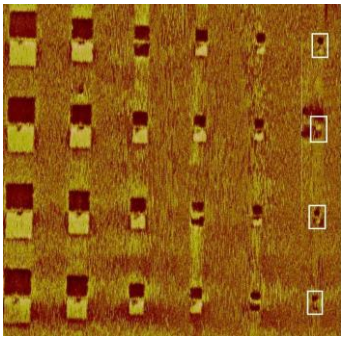
Diploma Thesis Overview

Investigations on the magnetic properties of Cobalt-Nickel multilayers and nano-structures

Abstract



Magnetic Quantum Cellular Automata **MQCA** uses field-coupled nanomagnets for signal propagation. One key aspect to realize such field-coupled devices is to reduce the currents that are needed for magnetization switching while maintaining the thermal stability of the device. It is assumed that samples exhibiting perpendicular magnetic anisotropy, like Co/Pt or Co/Ni multilayers could be a pathway to low switching currents and high thermal stability. Co/Ni films in comparison to Co/Pt films promise lower switching fields and therefore lower currents due to their lowered perpendicular magnetic anisotropy. Another key aspect are the coupling fields between neighbored nanomagnets that have to be increased. Therefore the amount of magnetic material in those films has to be increased, too. Also here the Co/Ni films promise better results, as Ni is ferromagnetic in comparison to Pt. For investigations of single domain nanodots, domain sizes of 1µm were needed. Fabricated dots of this size can be easily characterized by magneto optical microscopy. Hence, ease of measuring is traded off against low switching fields. Furthermore Co/Ni films are more difficult to realize than Co/Pt as many factors (seed layer, annealing, composition) influence the anisotropy and therefore the domain size.

Number One Result

Experiments have shown that lower switching fields and a higher coupling are possible using Co/Ni multilayers.

Supervisors:
Dr.-Ing. Markus Becherer
Prof. Dr. rer. nat. Doris Schmitt-Landsiedel