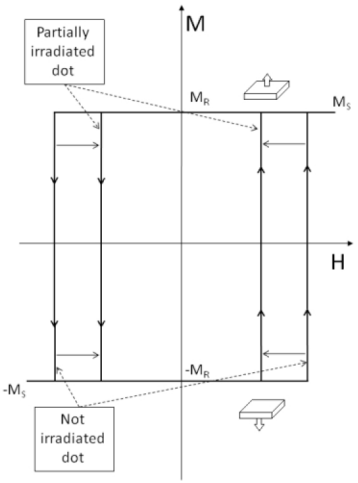
Diploma Thesis Overview

Nanomagnetic Logic: Controlled Switching of Field-Coupled Devices by Ion-Beam Irradiation

Abstract

Realizing logic devices with field-coupled nanomagnetic dots is a new promising technology to meet the markets needs for smaller and more convenient ways of computing. With nanomagnetic wires and logic gates information can be propagated and processed interconnect-free by an external clocking field. The bistable, non-volatile dots are made of ferromagnetic Cobalt/Platinum multilayer with perpendicular anisotropy and demonstrate low power consumption, high integration density and they operate at room temperature. This thesis investigates the feasibility of controlling the switching field of dots by partial ion-beam irradiation with the prospect of influencing the propagation direction in wires and logic gates. The general creation of artificial nucleation centers in multilayer films is studied as well as the effect of high-dose burn-ins and low-dose partial irradiation with a Gallium FIB of different acceleration voltages. The investigated nanomagnetic structures were produced by FIB irradiation as well as by FIB lithography and ion-beam etching.



Number One Result

Experiments have suggested that if switching fields of nanomagnetic dots are sufficiently high partial ion-beam irradiation can be used to reduce the switching field noticeably.

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