

Micro-Hall-Magnetometry: Stray Field Studies of Directly Written Nanostructures

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Micro-Hall-magnetometry is a sensor-based magnetic measurement technique that has proven to be a highly versatile tool to study individual and interacting magnetic micro- and nanostructures. Recently, the technique was combined with focussed electron beam induced deposition (FEBID), which is a promising direct-writing sample preparation technique with nanometer resolution. Functional magnetic nanostructures fabricated by FEBID can be deposited directly onto the surface of a (sub-)μm-sized Hall-sensor array enabling studies of the nanostructures' magnetic stray field. The application of these synergizing techniques will be illustrated by a recent investigation of thermally induced switching processes in a single building block of the artificial square spin ice lattice and their constituent macrospin-nanoislands. Results from temperature and magnetic field-dependent stray field measurements, including minor loops, will be discussed and compared to micromagnetic simulations. An outlook on the future prospects of the methods regarding possible studies of three dimensional magnetic nanostructures will be given.