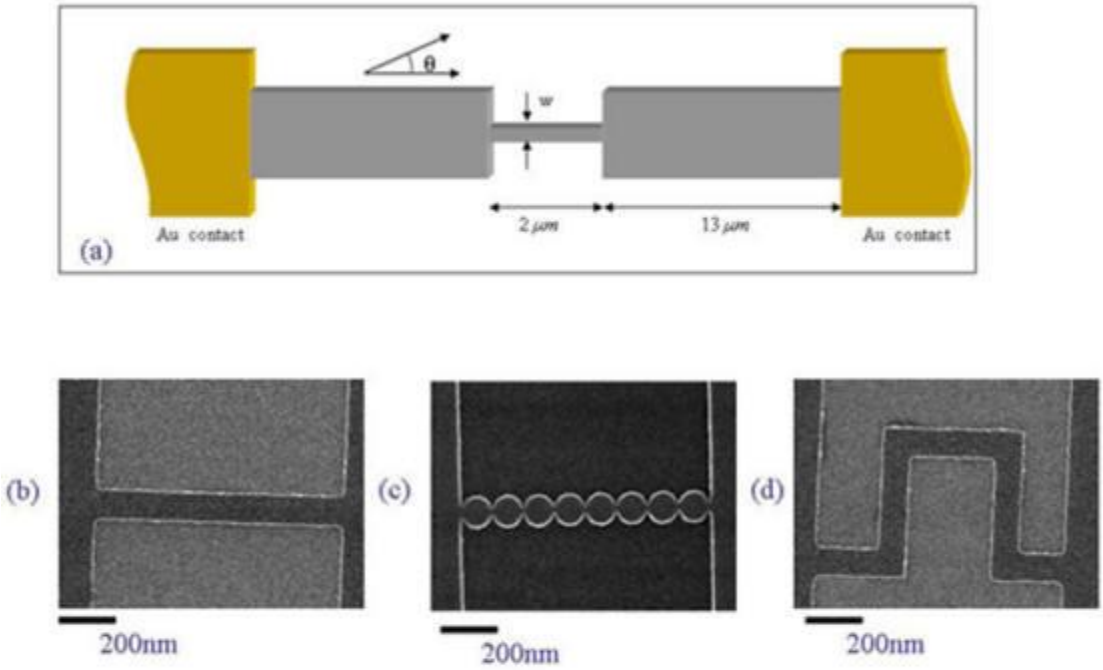
Spin-dependent transport (experiment)

The spin-dependent transport in nanometer scale magnets has recently been a subject of extensive experimental and theoretical studies. This has resulted in the observation of new phenomena relating to spin-scattering asymmetry, which promises a new generation of spin based electronic device technology. In order to exploit some of these new effects in magnetoelectronic devices, a detailed understanding of the magneto-transport in nanomagnetic structures at a basic level is required. At ISML we are investigating the spin dependent transport properties in a wide range of magnetic structures and devices.



(a) schematic representation of the fabricated ferromagnetic device geometry with Au External contacts (b) Scanning electron micrograph (SEM) of a constricted wire with w=100nm.(c) SEM of a single chain of nanomagnets with diameter =100nm, (d) SEM of castellated nanomagnets

Magnetic logic

Nanoelectronics offers the promise of ultra low power and ultra high-density of integration. At ISML , the idea of device-device interactions in the form of field coupling to provide local interconnectivity is being studied. We aim to take advantage of the dipolar magnetostatic interactions and exploit them to provide interconnectivity in large arrays of magnetic dots. For arrays of ferromagnetic dots, if the interaction between neighbouring dots is sufficiently strong, then the state of each dot can be uniquely determined by the state of its neighbours and its magnetization history. This concept could be used to build the next generation of spin logic devices similar to the quantum-dot cellular automata (QCA).