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In-situ LTEM investigation of switching of the magnetic patterns prepared by ion-beam irradiation.

The Co/Pt multilayers with perpendicular anisotropy were grown on electron transparent Si<sub>3</sub>N<sub>4</sub> membranes using electron beam evaporation. Regularly spaced 1 micron sized regions, with the easy axis of magnetization rotated into the plane of the film, were magnetically patterned via ion beam irradiation through a silicon stencil mask. Typical conditions were 700 keV nitrogen ions at doses of 5-10x10<sup>15</sup>cm<sup>-2</sup>. Transmission electron microscope analysis revealed no microstructural or chemical differences between the irradiated and non-irradiated regions. A wide log-normal grain size distribution, with approximately a 50nm mean diameter, was observed. In-situ magnetizing experiments, in which magnetization reversal processes were viewed directly in the presence of varying magnetic fields, were staged in the transmission electron microscope operated in the Lorentz mode. In the remanent state the in-plane areas supported a multidomain configuration with the domain size in the order of 350nm. When the in-plane field component was increased to 200Öe, domain wall motion was observed, resulting in alignment of the patterns with the direction of the applied field. The significant softening of the in plane regions as compared to the out of plane coercivity, (H<sub>C</sub> = 5-6kÖe) was confirmed by Kerr measurements of larger, 4x4mm areas exposed to the same doses of ion radiation.