

**Magnetization Configuration and Domain Wall Structure of Submicron Ring Element**

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Arrays of submicron ring elements with various  $R_{I/O}$  (the ratio of inner to outer diameter) and thicknesses were fabricated by E-beam lithographic technique to investigate the ring geometry dependence of domain configuration and head-to-head (HTH) domain wall structures. Magnetic Force Microscope (MFM) was used to observe magnetization configuration and domain wall.

An onion domain configuration at remanent state becomes stable with increasing  $R_{I/O}$  and decreasing ring thickness. No significant effect of ring size on the magnetization configuration was observed. Vortex domain wall structure changes to transverse domain wall structure when the thickness of ring element with  $R_{I/O} = 0.6$  and  $R_O = 2$  micron approaches 10 nanometer. Micromagnetic computer simulations were performed on ring elements having various thicknesses and  $R_{I/O}$  to confirm existence of vortex and onion state, and domain wall configuration.