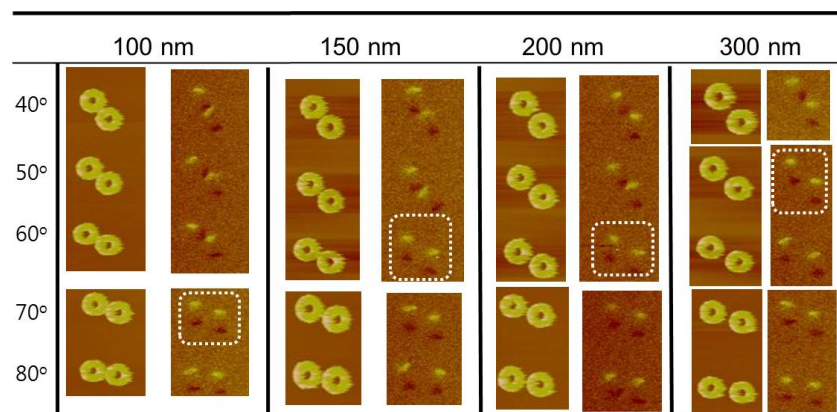


# Magnetostatic interaction between domain walls in sub-micron sized dual Co rings

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Magnetostatic interaction of magnetic domain walls (DWs) is investigated by using magnetic force microscope (MFM) techniques at the remanent state in closely placed Co dual rings with 10 and 20 nm in thickness and different spacing between Co rings. In an array of dual rings in  $10^\circ$  step against an applied field direction, the angular dependence of DW interaction shows an obvious change from coupling of DWs to decoupling of DWs in the MFM measurements, as shown in Fig.1. It is found that strong interaction between DWs at the lower angles and the smaller spacing is owing to the surface magnetic charge attraction. On the other hand, the volume magnetic charge attraction accounts for weak DW interaction at the higher angles and the larger spacing[1]. In addition, the dependence of the Co thickness on the magnetostatic DW interaction can be explained by the magnetic volume effects[2].



**Fig. 1.** AFM and MFM images of dual rings in terms of the gap spacing and the angle between the magnetic field direction and the coupling axis, where the white dotted box in the MFM images corresponds to the de-coupled remanent state of rings.

## References

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