Unidirectional motion of bubble domains in magnetic film

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The magnetic domain wall motions especially in patterned wire structures were studied intensively due to developments for next generation memory and logic devices. In the wire structures, the data bits stored as 'up' or 'down' domains can move along the wire direction thus only one-dimensional data transfer occurs. Here, we demonstrate two-dimensional data transfer by shifting bubble domains in the perpendicular anisotropy film. Tilted-uniaxial magnetic field was applied to break the symmetry of wall energy that result in asymmetric motion of domain wall due to Dzyaloshinskii–Moriya interaction [1]. After one-cycle of magnetic field oscillation, the bubble domains transfer to the field tilting direction through asymmetric bubble breathing. This bubble shift is a proof-of-principle experiment for magnetic-bubble cluster memory for two-dimensional data processing.

Reference

[1] S.-G. Je *et al.*, *Phys. Rev. B* **88**, 214401 (2013).

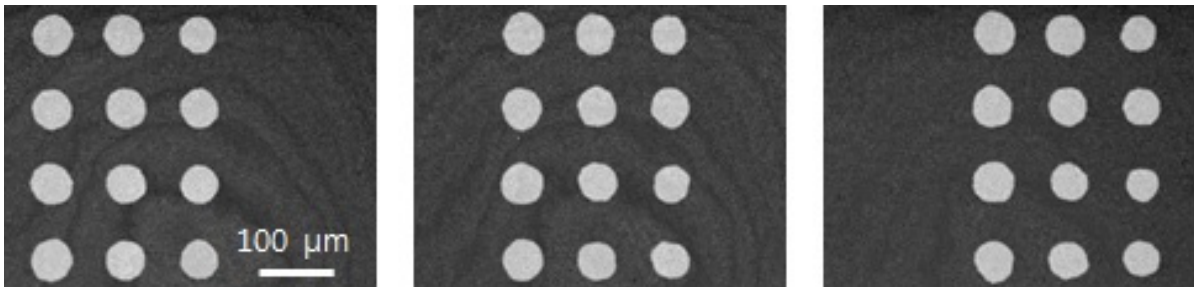

Fig. 1. Unidirectional motion of bubble domain array induced by tilted-uniaxial magnetic field oscillation.