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X-ray microscope Imaginging of skyrmions in Ultrathin Films with Strong Dzyaloshinskii-Moriya Interaction SEONGHOON WOO, MIT, BENJAMIN KRUGER, MATHIAS KLÄUI, University of Mainz, PETER FISCHER, Lawrence Berkeley National Laboratory, GEOFFREY BEACH, MIT, MIT COLLABORATION, UNIVERSITY OF MAINZ COLLABORATION, LAWRENCE BERKELEY NATIONAL LABORATORY COLLABORATION — Spin textures stabilized by the Dzyaloshinskii-Moriya interaction (DMI) have been of considerable recent interest due to extraordinary static and dynamic behaviors derived from their topological nature. It has recently been shown that DMI can also manifest in buried ultrathin sputtered film stacks. Here we examine magnetic bubble domains in submicron patterned dots with strong DMI. We use magnetic transmission X-ray microscopy to image the evolution of the magnetization configuration as a function externally applied fields. We imaged a series of [Pt(3nm)/Co(0.9nm)/GdOx(3nm)]x15, where the DMI is strong, and [Pt(3nm)/Co(0.9nm)/Pt(3nm)] x15 stacks, where DMI is small enough due to symmetric structure, and 15 repeats were used to enhance XMCD contrast. We observed that the size of domain can be significantly narrower for the case of strong DMI and micromagnetic modelling confirmed the observation. We also imaged that magnetic bubbles can be easily nucleated and controlled using external fields in micronsize-disk patterns. The static stability of bubbles for two cases were tested using external bias field, showing skyrmionic bubble has larger bubble-collapse field by the factor of two. Other qualitative and quantitative measurements will also be presented.

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