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Skyrmion bubble stability in thin films with strong Dzyaloshinskii-Moriya interaction LUCAS CARETTA, UWE BAUER, ALEXANDRA CHURIKOVA, MAXWELL MANN, GEOFFREY BEACH, Massachusetts Inst of Tech-MIT — The Dzyaloshinskii-Moriya interaction (DMI) at heavy-metal/FM interfaces stabilizes chiral spin textures, such as magnetic skyrmions [1]. Magnetic skyrmions are applicable to energy efficient spintronics [2,3]. However, room temperature stability of skyrmion bubbles (SBs) has not been quantified experimentally. We show when the ratio of the DMI effective field to the perpendicular anisotropy field is large, expanding bubble domains leave behind fine-scale dendritic structure, consisting of coupled 360 degree domain walls (DW). Dendritic structures are manipulated to form stable SBs. We imaged SBs in Pt(3nm)/Co(0.9nm)/Gd(1nm)/GdOx(30nm) films using Kerr microscopy to characterize the stability of SBs. We show that the field stability of SBs is a strong function of the applied in-plane field. Increasing in-plane field reduces the annihilation threshold of the skyrmions. The SB annihilation field becomes deterministic at in-plane fields near the DMI effective field. Simulations show Bloch points are formed in the SB DW at high in-plane fields, leading to the deterministic collapse of the bubbles.[1] A. Fert et al., Nat. Nano., 8, 152-156 (2013) [2] S. Woo et al., arXiv:1502.07376 (2015) [3] A. Fert et al., arXiv:1502.07853 (2015)

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