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Domain Wall Structure of Thin Film Magnetic Skrymions Investigated with a Single-Spin Sensor ALEC JENKINS, MATT PELLICCIONE, University of California, Santa Barbara, GUOQIANG YU, University of California, Los Angeles, CHRISTOPHER REETZ, PREETI OVARTCHAIYAPONG, University of California, Santa Barbara, KANG L. WANG, University of California, Los Angeles, ANIA BLESZYNSKI JAYICH, University of California, Santa Barbara — The nitrogen-vacancy (NV) center in diamond is an atomic scale defect that is capable of sensing magnetic fields with nanometer-scale spatial resolution and single electron spin sensitivity. By incorporating an individual NV center into a robust scanning probe microscope, we have recently constructed a versatile, NV-based magnetic imaging tool that operates from room temperature down to 5 K. We have imaged skyrmion structures in magnetic thin films with an interfacial Dzyaloshinskii-Moriya interaction (DMI) and perpendicular magnetic anisotropy. Magnetic skyrmions are topologically stabilized magnetization structures that are appealing for use in future high-density, low-power memory and logic devices. Utilizing the high spatial resolution of the NV microscope, we determine the domain wall structure of skyrmions in two classes of magnetic thin films: Ta/CoFeB/Pt/MgO/Ta and Pt/Co/W/Pt. The details of the domain wall structure in these materials has important implications for the functionality of magnetic bubbles in real devices, in particular for the stability of the bubbles and the current density required for their manipulation.

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