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Submicron measurements of domain wall dynamics in patterned (Ga,Mn)As devices A. L. BALK, M. J. WILSON, D. RENCH, P. SCHIFFER, N. SAMARTH, Dept. of Physics, Penn State University, University Park PA 16802, M. NOWAKOWSKI, D. D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara CA 93106 — Contemporary interest in proof-of-concept semiconductor spintronic devices provides a clear motivation for fundamental studies of magnetic domain walls (DWs) in ferromagnetic semiconductors such as (Ga,Mn)As. Here, we use the anomalous Hall effect to measure the magnetic DW position and velocity in micropatterned (Ga,Mn)As devices with submicron spatial resolution. Our measurements focus on the early stages of the creep regime. Statistical analysis of temperature-dependent Barkhausen jumps provides insights into thermally activated DW hopping, while field-dependent measurements of the DW position show behavior suggestive of reversible nanoscale DW flexing. Finally, we demonstrate a feedback technique to map out submicron variations in the DW pinning potential. These measurements are complemented by dynamic magneto-optical Kerr effect imaging of our devices. This work was supported by ONR, NSF and ONR-MURI.

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