Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Reduction in critical current for domain wall injection by ion irradiation of perpendicular magnetic anisotropy nanowires TIMOTHY PHUNG, IBM Almaden Research Center/Stanford University, LUC THOMAS, SEE-HUN YANG, CHARLES RETTNER, KWANG-SU RYU, JOHN BAGLIN, BRIAN HUGHES, STUART PARKIN, IBM Almaden Research Center — One of the key problems for realization of domain wall motion devices is the reliable and energy efficient injection of domain walls (DWs) into magnetic nanowires. In this work, we explore the injection of domain walls in perpendicular magnetic anisotropy nanowires (Co/Ni multilayers) which are locally softened by ion irradiation. We observe a minimum in the domain wall injection critical current, which occurs where the anisotropy of the irradiated region transitions from out of plane to in plane anisotropy. Furthermore, we find that the irradiated site acts as a pinning site for the DWs. At the irradiation site, we are able to create localized nanosecond long pulsed magnetic fields used to inject the DWs. By performing DC resistance measurements after each injection event, we are able to probe for the existence of the domain wall, and also find the strength of the ion irradiated pinning site. Using the above technique, we have demonstrated a five fold reduction in the domain wall injection current.

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Date submitted: 11 Nov 2011 Electronic form version 1.4