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Single domain switching by spin-polarized current in GaMnAs nanodevice A. CHERNYSHOV, M. OVERBY, L.P. ROKHINSON, Department of Physics, Purdue University, West Lafayette, IN 47907, J.K. FURDYNA, X. LIU, Department of Physics, University of Notre Dame, Notre Dame, IN 46556 — Dilute magnetic semiconductors (DMS) have a potential to bring electrostatic control into magnetic domain and bridge the gap in control efficiency between conventional ferromagnetic materials and semiconductors. A significant progress has been demonstrated in current-induced magnetization reversal, where DMS materials show a few orders of magnitude current reduction compared to the conventional ferromagnets. In this work we demonstrate and investigate in-plane single domain magnetization rotation and reversal in GaMnAs nanodevices by spin-polarized dc electric current. Single domain is defined lithographically, which eliminates unambiguity associated with previously investigated multi-domain switching. The magnetization orientation can be controllably switched between two [100] and [010] easy axes or reversed. Current alone is not sufficient to switch the magnetization and have been aided by small in-plane magnetic field ($\sim$10mT). We observe linear dependence of critical currents with respect to magnetic field and analyze it in terms of current induced torque on the domain walls. The critical current densities are of the same order as for out-of-plane magnetization switching reported by Ohno, et. al.

A. Chernyshov
Department of Physics, Purdue University, West Lafayette, IN 47907

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