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Electrical and Optical Characterization of Spin Transfer Torques[1]

JOSHUA EMERICK, S.C. PARKS, K. LI, A. HAUSER, J. E. THOMPSON, J. CIRALDO, J. LUCY, F. Y. YANG, E. JOHNSTON-HALPERIN, Department of Physics, The Ohio State University — The spin-transfer torque (STT) phenomenon is a direct outgrowth of giant magnetoresistance (GMR) in the regime of high current density. Investigations of this phenomenon have contributed to improved understanding of fundamental processes and revealed the potential for technological innovation. To further this exploration, we have constructed an instrument that simultaneously measures microwave electrical response and magnetization in an external magnetic field of up to 1 T. The microwave probe is sensitive at frequencies up to 30 GHz and the magneto-optical Kerr effect (MOKE) magnetometer is configured to measure the magnetization of the active region during operation (resolution of $\sim$ 100 μm). We present the experimental configuration of this instrument and calibration data from prototype samples. The ability to directly measure layer orientation for active devices provides a powerful tool for the investigation of STT.

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Joshua Emerick
Department of Physics, The Ohio State University

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