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Magnetization reversal and anisotropy at the Fe/AlGaAs (001) interface GUNTER LUEPKE, HAIBIN ZHAO, DIYAR TALBAYEV, Department of Applied Science, College of William and Mary, Williamsburg, VA, 23185, AUBREY HANBICKI, CONNIE LI, OLAF VAN'T ERVE, GEORGE KIOSEOGLOU, BERRY JONKER, Naval Research Laboratory, Washington, DC, 20375 — We distinguish the magnetic reversal process of an Fe interface layer from that of the bulk in Fe/AlGaAs heterostuctures using magnetization induced second harmonic generation (MSHG) and the magneto-optical Kerr effect (MOKE). We find that the switching characteristics are distinctly different – single step switching occurs at the interface layer, while two jump switching occurs in the bulk for the magnetic field orientations employed. This indicates a larger contribution from uniaxial versus cubic anisotropy at the interface layer, causing the absence of an intermediate single domain state during reversal. The general assumption that spins within a ferromagnetic metal films are strictly parallel due to strong exchange coupling is therefore incorrect at the interface. Our results show that MSHG is a powerful technique to probe interface magnetic properties in non-centrosymmetric hybrid structures.

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