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Electrical detection of FMR in epitaxial FM/n-GaAs heterostructures by tunneling anisotropic magnetoresistance[1] CHANGJIANG LIU, YAKOV BOYKO, CHAD GEPPERT, KEVIN CHRISTIE, GORDON STECKLEIN, PAUL CROWELL, University of Minnesota, SAHIL PATEL, CHRIS PALMSTRØM, University of California, Santa Barbara — Electrical detection of ferromagnetic resonance (FMR) is a widely used technique for the detection of spin pumping. We report here a new means for electrical detection of FMR based on tunneling anisotropic magnetoresistance (TAMR). The TAMR is due to the spin-orbit coupling at the FM/n-GaAs interface. Because the tunneling resistance in this case depends on the orientation of the magnetization with respect to the crystalline axes, the opening of the cone angle when the FM is driven resonantly produces a dc voltage which is proportional the square of the time-dependent magnetization. Our samples are FM//(001) n-GaAs heterostructures grown by MBE, where the FM is Fe, Co_2MnSi, or Co_2FeSi. All three of these heterostructures show non-local spin transport effects when they are biased. In each case, we observe a symmetric FMR peak with a bias and angular dependence that tracks the TAMR almost exactly. The resonance field depends on the anisotropies as expected, and the linewidth is smallest for Co_2MnSi. At low temperatures, the amplitude of the FMR signal is clearly sensitive to the spin accumulation, but this effect is not due to spin pumping.

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