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On chip detection of magnetic dynamics of single microscopic magnetic dot XIN FAN, RONG CAO, YAPING ZHANG, TAKAHIRO MORIYAMA[1], JOHN XIAO, Department of Physics, University of Delaware — Fast magnetic switching in data storage and microwave spintronic devices demand the understanding of magnetic dynamics in microscopic magnetic elements. Ferromagnetic resonance (FMR) spectrum measured with a microwave cavity or transmission line is one of the most popular tools to investigate the magnetic dynamics. These types of measurements usually require that at least one of the sample dimensions should be comparable to the microwave wavelength. Here we present an induction-based detection to obtain the ferromagnetic resonance spectrum from a single microscopic magnetic dot. A magnetic dot with a lateral size of 40×40 μm^2 and a thickness of 40 nm is lithographically patterned on top of a coplanar waveguide (CPW). A coplanar airprobe is positioned over the sample and perpendicular to the underlying CPW to pick up the microwave signal. With this setup, we are able to measure the FMR spectrum of the magnetic dot with very strong signal (15dB change in S21). Such direct detection of a single microscopic magnetic element also provides a simple way to investigate the nonlinear spin dynamics. This work was supported by NSF DMR Grant No. 08242249.

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