

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

On-chip coplanar stripline for micron-scale ferromagnetic resonance and spin pumping devices¹ SHANE WHITE, ANDREW BERGER, ROHAN ADUR, SERGEI MANUILOV, P. CHRIS HAMMEL, The Ohio State University — Ferromagnetic resonance (FMR) spin pumping is a rapidly growing field. While previous measurements have focused on large-scale (\sim mm) devices, dimensions will need to be reduced to prove useful for applications. On-chip microwave structures offer a solution to this by providing localized microwave fields that can be used to resonate small device geometries while leaving them easily accessible for electrical connections, as opposed to the “flip-chip” or resonant cavity methods. Using a shorted coplanar strip (CPS) waveguide, we perform broadband (6-12 GHz) FMR measurements in a permalloy bar of dimensions $20\mu\text{m} \times 1\mu\text{m} \times 20\text{nm}$ —too small to be detected by measuring microwave reflections from a cavity. FMR is detected in the permalloy strip through changes in the anisotropic magnetoresistance [1]. This scheme allows for quantitative characterization of magnetization dynamics and microwave fields. These findings demonstrate that on-chip microwave structures will enable new, smaller device geometries and measurement possibilities for a variety of spin pumping systems.

[1] M. V. Costache, et. al, Appl. Phys. Lett. 89, 232115 (2006).

¹US DOE award number DE- FG02-03ER46054 and NSF MRSEC award number DMR-0820414

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Date submitted: 15 Nov 2013

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