

Abstract Submitted
for the 4CF11 Meeting of
The American Physical Society

Growth of High-Quality Yttrium Iron Garnet Thin Films on Metallic Electrodes YIYAN SUN, YOUNG-YEAL SONG, MINGZHONG WU — Yttrium iron garnet (YIG) is a magnetic garnet and shows extremely low loss at microwave frequencies. One typically grows YIG on single-crystal gadolinium gallium garnet (GGG) substrates. For some monolithic on-chip device applications, however, one needs to grow YIG films on metallic electrodes. This is challenging due to problems with the oxidation, diffusion, and breakup of metallic electrodes during the deposition of YIG films at high temperatures. This presentation reports on the development of new sandwich-type bottom electrodes and the growth of low-loss YIG thin films on such electrodes. The new electrodes consist of a thick metallic layer sandwiched between two thin cladding layers. The thick layer is a high-conductivity metal. The thin cladding layers are materials with high oxidation resistance and good thermal stability. The electrodes were deposited at room temperature by magnetron sputtering, while the YIG films were deposited at 650 °C by pulsed laser deposition. Scanning electron microscopy, x-ray diffraction, and energy dispersive spectroscopy measurements confirmed the structure of the YIG films. Static magnetic measurements indicated a saturation induction of about 1471 G, which was 16% smaller than that for a YIG bulk. Ferromagnetic resonance measurements yielded a peak-to-peak linewidth of about 0.8 Oe at 9.45 GHz.

Yiyan Sun
Colorado State University

Date submitted: 13 Sep 2011

Electronic form version 1.4