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Detection of Magneto-Crystalline Anisotropy in YIG Films Formed by Aerosol Deposition SCOOTER JOHNSON, E.R. GLASER, KONRAD BUSSMANN, FREDERIC RACHFORD, FRITZ KUB, CHARLES EDDY, JR., Naval Research Lab — We have employed aerosol deposition (AD) to form dense polycrystalline films of yttrium iron garnet (YIG) at room temperature in thicknesses of 0.3–11 μm onto a-plane sapphire substrates. AD is a room-temperature process that accelerates a precursor of dry sub-micron-sized crystallites to impact and form a thick dense nano-crystalline film that is well-bonded to the substrate. We present results of ferromagnetic resonance (FMR) taken on the as-deposited films. In addition to the main resonance at 2815 G (in-plane) and 4650 G (out-of-plane) we find a distinct resonance mode H_r' that depends on film thickness. It appears in the 0.3-μm-thick film, becomes most intense in the 1-μm-thick film, and saturates for thicker films. H_r' moves with film orientation in the applied field from 4085 G (in-plane) to 3010 G (out-of-plane). FMR performed by rotating the applied field in the film plane shows that H_r' exhibits an anisotropy that reflects the crystallographic orientation of the substrate. These results suggest that during the early stages of growth a magneto-crystalline anisotropy is created in the interface region of the film that may be oriented to the crystallographic axis of the sapphire possibly caused by local heating that may facilitate recrystallization.

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