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Enhancement of Magnetization in $Y_3Fe_5O_{12}$ Epitaxial Thin Films. JACK T. BRANGHAM, JAMES C. GALLAGHER, ANGELA S. YANG, SHANE P. WHITE, ROHAN ADUR, WILLAM T. RUANE, BRYAN D. ESSER, MICHAEL R. PAGE, P. CHRIS HAMMEL, Ohio State Univ - Columbus, DAVID W. MCCOMB, Center for Electron Microscopy and Analysis, Dept of Materials Science and Engineering, The Ohio State University, Columbus, OH 43212, FENGYUAN YANG, Ohio State Univ - Columbus — The ability to generate pure spin currents has applications in telecommunications, radar, and spin-based logic. $Y_3Fe_5O_{12}$ (YIG) is one of the best materials for dynamic generation of spin currents due to its low damping, narrow ferromagnetic resonance (FMR) linewidth, and insulating behavior. We grow stoichiometric, high quality, epitaxial YIG thin films with thicknesses ranging from 4 to 250 nm on $Gd_3Ga_5O_{12}$ by off-axis magnetron sputtering and characterize the YIG films by various techniques. The temperature dependence of the saturation magnetization was independently measured by in-plane vibrating sample magnetometry, out-of-plane magnetic shape anisotropy, and angular-dependent FMR absorption from 10 K to the Curie temperature of 530 K. The room temperature saturation magnetization was also measured with frequency dependent FMR. All measurements show a magnetization enhancement of 15% or greater when compared to reported magnetization values of bulk YIG crystals. We speculate this is due to suppression of the long wavelength magnons due to the finite size of the films.

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