

Abstract Submitted
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High quality TmIG films with perpendicular magnetic anisotropy grown by sputtering C. N. WU, C. C. TSENG, S. L. YEH, Dept. of Physics, National Tsing Hua Univ., Taiwan, K. Y. LIN, C. K. CHENG, Y. T. FANCHIANG, M. HONG, Graduate Institute of Applied Physics and Dept. of Physics, National Taiwan Univ., Taiwan, J. KWO, Dept. of Physics, National Tsing Hua Univ., Taiwan — Ferrimagnetic thulium iron garnet (TmIG) films grown on gadolinium gallium garnet substrates recently showed stress-induced perpendicular magnetic anisotropy (PMA), attractive for realization of quantum anomalous Hall effect (QAHE) of topological insulator (TI) films via the proximity effect. Moreover, current induced magnetization switching of Pt/TmIG has been demonstrated for the development of room temperature (RT) spintronic devices.¹ In this work, high quality TmIG films (about 25nm) were grown by sputtering at RT followed by post-annealing. We showed that the film composition is tunable by varying the growth parameters. The XRD results showed excellent crystallinity of stoichiometric TmIG films with an out-of-plane lattice constant of 1.2322nm, a narrow film rocking curve of 0.017 degree, and a film roughness of 0.2 nm. The stoichiometric films exhibited PMA and the saturation magnetization at RT was 109 emu/cm³ (RT bulk value 110 emu/cm³) with a coercive field of 2.7 Oe. In contrast, TmIG films of Fe deficiency showed in-plane magnetic anisotropy. The high quality sputtered TmIG films will be applied to heterostructures with TIs or metals with strong spin-orbit coupling for novel spintronics. 1. C. O. Avci et al., Nat. Mater. (2016, in press)

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