Low damping constant of $LaSrMnO_3$ epitaxial films

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The low damping materials are required for high-speed operation and low power consumption spin dynamic devices. $Y_3Fe_5O_{12}$ (YIG) is one of the popular low damping materials; however, it requires micron thickness and YIG has to grow on $Gd_3Ga_5O_{12}$ (111) substrate. In this report, we present the in-plane low damping of $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) epitaxial films ($7 \leq t \leq 53$ nm) grown on the $(LaAlO_3)_{0.3}$-$(SrAl_{0.5}Ta_{0.5}O_3)_{0.7}$ (100) substrates. The damping constant of LSMO with a thickness of 53 nm measured at room temperature (RT) showed values of 7×10^{-4} for magnetic easy axis and 6×10^{-4} for magnetic hard axis at RT. The low damping of LSMO might be considered by half-metallic band structure that could suppress spin flipping caused by minority spins during precession. The thickness dependence of the damping constant indicates the existence of a surface dead layer in the LSMO.

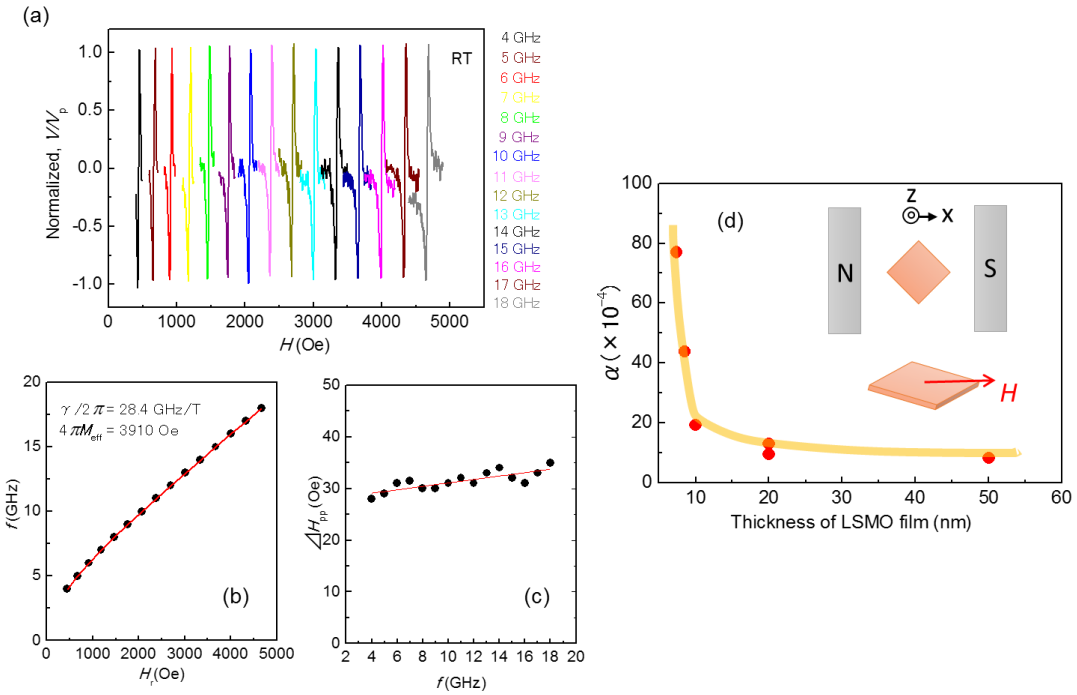

Figure 1 (a) FMR spectrum, (b) FMR frequency versus resonance field (H_r), (c) FMR linewidth (ΔH_{pp}) as a function of frequency for the LSMO films (t = 53 nm), and (d) LSMO thickness dependence of α_{eff}.

Acknowledgements: This research was partially funded by a Grant-in-Aid for Scientific Research (B) (No. 15H03548), and by young leader researcher overseas dispatch program in Tohoku university.