Magneto-dynamic properties of LSMO films on STO modified by buffer layers

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Manganite perovskites $La_xSr_{1-x}MnO_3$ (LSMO), generally referred as colossal magnetoresistance materials, high spin polarization and robust ferromagnetic order at room temperature. Recently reported possibility of tuning magnetic properties of LSMO by strain have attracted significant interest due to possible application of LSMO-based devices in spintronics. We have explored how strain induced changes in magnetic properties of LSMO can be controlled by MgO and $BiTiO_3$ (BTO) buffer layers deposited on $SrTiO_3$ (STO) substrate. Using Ferromagnetic Resonance (FMR) Spectroscopy and Vibrating Sample Magnetometry (VSM) we were able to test dynamic and static magnetic response, respectively. VSM measurements reveal that all the samples studied exhibit coercive field smaller than 100 Oe, which make them suitable for spintronic applications. The strongest magnetic properties is revealed by the LSMO/STO films. However, it is only slightly reduced in the LSMO films grown on MgO and BTO buffer. FMR spectra show a significant difference between LSMO/STO films and LSMO/(MgO,BTO)/STO heterostructures as well. The highest Gilbert damping constant is observed for LSMO films on MgO buffer, while the smallest one for the LSMO films deposited directly on STO. In all the cases damping coefficient is small, i.e. below 10^{-3}, which indicates superior quality of the films and long propagation length of spin waves of the order few micrometers.