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Magnetic anisotropy and anisotropic damping in LSMO/STO(001) HANKYU LEE, IGOR BARSUKOV, LIU YANG, University of California, Irvine, ADRIAN SWARTZ, BONGJU KIM, HAROLD HWANG, Stanford University, ILYA KRIVOROTOV, University of California, Irvine — $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) is a promising material for spintronics applications due to its half-metallic nature. To successively exploit LSMO, both the magnetic anisotropy (MA) and damping need to be well understood and, ultimately, controlled. Here, we study 30 nm epitaxial LSMO thin films grown by pulsed laser deposition on TiO_2 terminated (001)$SrTiO_3$. By means of angle- and frequency dependent ferromagnetic resonance (FMR) at room temperature, we separate various contributions to the in-plane MA: i) The four-fold magnetocrystalline anisotropy is present but negligibly small. ii) The strongest contribution Buni = 4.2 mT is uniaxial with EA along [010]. While uniaxial MA in LSMO systems is commonly related to terrace formation from the substrate miscut, we find that the terrace direction and the MA symmetry axes do not correlate, indicating a different origin of the MA. By evaluating the FMR linewidth, three nonlinear magnetic damping channels due to the two-magnon scattering are found: j) The dominant four-fold contribution with maxima along $< 100 >$ axes emerges due to the crystalline defects. jj) A two-fold contribution with the maximum along [010] and jjj) a small two-fold contribution with maximum perpendicular to the terraces are identified.

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