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Influence of oxygen concentration on the magnetic properties of multifunctional La_2CoMnO_6 thin films[1] ARUNAVA GUPTA, Center for Materials for Information Technology and Department of Chemistry, University of Alabama, Tuscaloosa, Alabama 35487, HAIZHONG GUO, JIANDI ZHANG, Department of Physics, Florida International University, Miami, FL 33199, M. VARELA, S.J. PENNYCOOK, Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831 — The dependence of the magnetic properties on oxygen concentration in epitaxial La_2CoMnO_6(LCMO) thin films has been investigated grown by pulsed laser deposition (PLD). Using x-ray magnetic circular dichroism spectroscopy (XMCD) at Mn-$L_{2,3}$ and Co-$L_{2,3}$ edges, we have determined that the primary ion valence state is Mn^{4+}/Co^{2+}. Additionally, we see evidence of some low-spin Co^{3+} ions, corresponding to the existence of a second ferromagnetic (FM) phases in our samples. The existence of oxygen vacancies induces the local vibronic Mn^{3+}-O-Co^{3+} superexchange interactions in direct competition with the static FM Mn^{4+}-O-Co^{2+} interactions. This results in the appearance of a new low temperature FM phase and suppression of the high-temperature FM phase, creating two distinct magnetic phase transitions.

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