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The effects of annealing on the infrared and optical properties of $La_{0.67}Sr_{0.33}MnO_3$ films[1] PENG XU, T.J. HUFFMAN, D.R. BRANAGAN, A.J. HOLLINGSHAD, N.E. PENTHORN, D.J. BROOKER, M.M. QAZILBASH, Department of Physics, College of William and Mary, P. SRIVASTAVA, T. GOEHRINGER, GRACE YONG, V. SMOLYANINOVA, R. KOLAGANI, Department of Physics, Astronomy and Geosciences, Towson University — $La_{0.67}Sr_{0.33}MnO_3$ (LSMO) films grown by pulsed laser deposition on lanthanum aluminate substrates undergo a phase transition from ferromagnetic metallic state to paramagnetic insulating state at T_c of about 350 K. This second-order phase transition proceeds via a phase coexistence regime over an extended temperature range. Annealing affects the strain and oxygen content in films thereby causing significant changes to the magnetic properties, electronic structure, lattice distortion, and possibly the nanoscale properties of coexisting phases. We use ellipsometry and Fourier-transform infrared spectroscopy to investigate the effects of annealing on LSMO films over a broad spectral range from ultraviolet to far infrared. We deduce the Jahn-Teller energy splitting and the Hund's coupling energy from our data on annealed and unannealed films.

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