Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Temperature dependent near field infrared microscopy of $La_{0.67}Sr_{0.33}MnO_3$ thin films[1] PENG XU, TJ HUFFMAN, MM QAZILBASH, Department of Physics, College of William and Mary, INHAE KWAK, AMLAN BISWAS, Department of Physics, University of Florida — $La_{0.67}Sr_{0.33}MnO_3$ thin films are studied with apertureless, scattering-type near field microscopy at mid-infrared wavelength and varied temperatures. Spatial resolution of about 20 nm is achieved with our technique. The temperature-dependent resistivity shows a continuous second order phase transition between insulating and metallic phases. At most temperatures, near-field infrared microscopy reveals local persistent phase separation that is independent of temperature. It is possible that the local persistent phase separation is induced by strain inhomogeneity in the thin films. Remarkably, we also observe global time-dependent changes in the infrared near-field signal upon repeated scanning of the same microscopic area at a fixed temperature. This observation is consistent with time-dependent, fluctuating conductivity in the vicinity of a second order phase transition.

[1]This work was supported by the National Science Foundation

Peng Xu
College of William and Mary

Date submitted: 06 Nov 2015 Electronic form version 1.4