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Real-Space Imaging of Electronic Phase Separation in a Mn-Doped Bilayered Ruthenate[1] TAE-HWAN KIM, M. ANGST, R. JIN, X.G. ZHANG, J.F. WENDELKEN, A.P. LI, Oak Ridge National Laboratory, B. HU, E.W. PLUMMER, The University of Tennessee — Transition-metal oxides with multiple nearly degenerate states show very complicated phase diagrams. Small perturbations can often dramatically change their functionalities. It is believed that electronic phase separations (PS) play an important role in the exotic functionality. Direct experimental observation of PS has thus become crucial to understanding underlying mechanisms of the striking functionalities. We have studied the PS and the evolutions of phase domains with temperature near the Mott transition in a Mn-doped bilayered ruthenate $Sr_3(Ru_{1-x}Mn_x)_2O_7$. Our experimental approach combines electron microscopy, scanning tunneling microscopy, and electron transport spectroscopy, which provide unprecedented capabilities of imaging PS and interrogating individual microscopic domains in situ. A quantitative correlation has been determined between the macroscopic metal-insulator transition and the microscopic phase domain percolation in $Sr_3(Ru_{1-x}Mn_x)_2O_7$.

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