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A local metallic state in globally insulating $La_{1.24}Sr_{1.76}Mn_2O_7$ well above the metal-insulator transition ZHE SUN, J. FRASER DOUGLAS, University of Colorado at Boulder, ALEXEI V. FEDOROV, YI-DE CHUANG, Advanced Light Source, Lawrence Berkeley National Laboratory, HONG ZHENG, JOHN F. MITCHELL, Materials Science Division, Argonne National Laboratory, D. S. DESSAU, University of Colorado at Boulder — $La_{2-2x}Sr_{1+2x}Mn_2O_7$ is a typical colossal magnetoresistive oxide, and it shows a drastic transition from a low-temperature metal to a high-temperature insulator at 120K -160K. The famous CMR (colossal magnetoresistive) effect usually accompanies the metal-insulator transition. Using angle-resolved photoemission spectroscopy (ARPES) we studied the electronic structure of a bi-layer manganite compound $La_{2-2x}Sr_{1+2x}Mn_2O_7$ (x=0.38). We found that in the insulating state there remain local metallic regions up to a very high temperature. In these metallic regions, the electronic behavior has minimal change with temperature. Our data indicate that the metal-insulator transition is a new type and an "emergent" phenomenon driven by the phase separation and percolation effect. The CMR effect can also be understood in the framework of the phase separation and percolation effect.

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