Abstract Submitted
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Metal-to-insulator transition in a columnar nanocomposite oxide[1] ZHAOLIANG LIAO, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70810, USA, PENG GAO, Department of Materials Science and Engineering, University of Michigan, Ann Arbor, MI 48109, USA, SHANE STADLER, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70810, USA, XIAOQING PAN, Department of Materials Science and Engineering, University of Michigan, Ann Arbor, MI 48109, USA, RONGYING JIN, E. WARD PLUMMER, JIANDI ZHANG, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70810, USA — The capability of tuning lattice strain, composition, and dimensionality in epitaxial film growth provide a new avenue of exploring new functionality in correlated electron materials. Here we demonstrated a chemical ratio controlled metal-insulator transition in the nanocomposite films of V_2O_3-$La_{2/3}Sr_{1/3}MnO_3$ (LSMO) grown on $LaAlO_3$ (111) substrate through alternative deposition of LSMO and V_2O_3. A V-Mn ion exchange between V_2O_3 and LSMO occurs during the growth and results in the formation of nanoscale and vertically columnar-like insulating Mn_2O_3 and metallic $La_{1-x}Sr_xVO_3$ composite, as qualitatively revealed by scanning transmission electron microscopy. As determined by transport measurement, a metal-insulator transition is found in the composite films, which depends on the ratio of deposition time of V_2O_3 to LSMO.

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