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Oxygen-isotope-substitution-induced nanoscale crystallinity and origin of metal-insulator transition in $Sm_{0.5}Sr_{0.5}MnO_3$[1] YANG REN, A.N. STYKA, Argonne National Laboratory, O. YU. GORBENKO, Moscow State University, N.A. BABUSHKINA, Russian Research Center "Kurchatov Institute", J.-Q. YAN, Ames Lab & Iowa State University, D.E. BROWN, Northern Illinois University, D.I. KHOMSKII, Universitaet zu Koeln — Competing effects of $^{16}O \rightarrow ^{18}O$ isotope substitution and magnetic field on the phase separation and structural property in $Sm_{0.5}Sr_{0.5}MnO_3$ have been studied by using high-resolution high-energy X-ray diffraction under magnetic fields up to 7 T. A close correlation between physical properties and the crystallinity of the compounds is observed. The oxygen-isotope-substitution-induced metal-insulator transition is caused by nanoscale crystallite formation in the compound with ^{18}O below a phase-separation temperature $T_{ps} \sim 100$ K. Different lattice effects on the magnetoresistance are identified, among which the largest one is due to magnetic field enhanced crystallization of the nanoscale crystallites.

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