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Research paper

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Effects of A-site cation disordering on the transport properties of half-doping $\text{La}_{0.5}\text{Ca}_{0.5}\text{MnO}_3$ manganites

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Abstract

Polycrystalline samples of $\text{La}_{0.5-x}\text{Y}_x\text{Ca}_{0.5-y}\text{Sr}_y\text{MnO}_3$ ($0 \leq x \leq 0.20$, $0 \leq y \leq 0.22$) were synthesized by solid state reaction method. The degree of A-site disorder increases linearly with increasing doping content. Structural analysis of X-ray diffraction shows that samples crystallize in a pure orthorhombic Pnma phase and antisymmetry stretching appears in MnO_6 octahedron. Raman spectra illustrate rotationlike mode and antisymmetry stretching mode are both hardened with increasing A-site disordering, indicating the Jahn-Teller distortion strengthened. The metal-insulator transition temperature and MR values are found to decrease with increasing A-site disordering. The suppression of metallic behavior is ascribed to the enhancement of Jahn-Teller effect caused by increasing A-site disordering.

Keywords: Raman spectra; Jahn-Teller distortion; electrical transport properties.

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