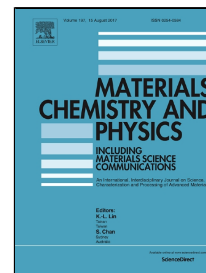


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Octahedral distortion induced Phonon Vibration and Electrical conduction in
 A_2NdSbO_6 (A = Ba, Sr, Ca)

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Keywords: Ceramics; double perovskite; phonons; grain boundaries; small polaron.

Abstract:

A meticulous comparison of crystal structures and vibrational degrees of freedom in the light of A-site substitution for polycrystalline double perovskite oxides A_2NdSbO_6 (A = Ba, Sr, Ca) has been carried out for accurate identification of crystal symmetry and distortions in these materials. Raman spectra, correlated with group theoretical calculations, characterizes the normal modes of vibrations associated with the oxygen octahedra and establishes a rhombohedral structure for Ba_2NdSbO_6 and monoclinic structure for Sr_2NdSbO_6 and Ca_2NdSbO_6 supporting the X-ray diffraction results. The symmetric stretching mode occurring at the highest frequency is identified as the breathing vibration of the SbO_6 octahedra. The frequency and temperature responses of electrical properties studied by impedance spectroscopy show the dominant effect of grain boundaries on the conduction process. The conductivity spectroscopic plots reveal a semiconducting nature. A correlation has been drawn between the vibrational and electrical measurements showing the interplay between the phonon and electronic properties.

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