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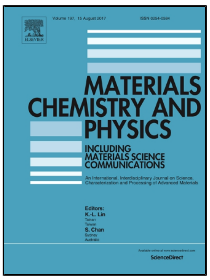


Octahedral distortion induced Phonon Vibration and Electrical conduction in $A_2NdSbO_6$ (A = Ba, Sr, Ca)

Saswata Halder, Md. Sariful Sheikh, Binita Ghosh, T.P. Sinha

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

Saswata Halder[1*], Md. Sariful Sheikh[1], Binita Ghosh[2], T. P. Sinha[1].

[1]*Department of Physics, Bose Institute, 93/1, Acharya Prafulla Chandra Road, Kolkata 700009, India.*

[2]*St. Paul's Cathedral Mission College, 33/1Raja Rammohan Roy Road, Kolkata 700009, India.*

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.

*Corresponding author. Tel: +91 33 23031194 Fax: +91 33 23506790

Email: saswata.h88@gmail.com.