The effect of rare earth dopants on the of Perovksite materials for thermoelectric applications

Palani Rajasekaran¹, Mukannan Arivanandhan², A S Alagar Nedunchezian², Ramasamy Jayavel²,
Masaru Shimomura¹

¹Graduate School of Science and Technology (GSST), Research Institute of Electronics (RIE), Shizuoka
University, Hamamatsu, Japan.
²Centre for Nanoscience and Technology, Anna University, Chennai, India.
E-mail: rajasekaran255@gmail.com

Abstract:

Thermoelectrics is one of the promising technologies to generate electricity from waste heat which is coming out from industries and automobiles. The performance of a thermoelectric material is based on the electrical and thermal conductivity of the material. Bismuth telluride is one of the well-known thermoelectric material for low temperature applications. Oxide materials are highly useful for high temperature thermoelectric applications. Metal oxides based Perovskite have attracted high attentions as a novel thermoelectric material due to their excellent tunable electrical conductivity. In the present work Ba₁₋ₓLaₓSnO₃ and Ba₁₋ₓSrₓSnO₃ materials were prepared with x=0,0.02,0.06,0.1 by polymerization complex(PC) method and pellets of the prepared materials were made using high pressure and high temperature sintering (HPHTS) method. The synthesized materials were characterized by XRD, SEM and TEM analysis for studying their structural and morphological properties. XRD analysis revealed the mixed phases of tin oxide and Ba₁₋ₓSrₓSnO₃ perovskite structure. The SEM images of Ba₁₋ₓLaₓSnO₃ shows spherical like morphology whereas Ba₁₋ₓSrₓSnO₃ and BaSnO₃ shows rod like morphology with diameter of 10 to 15 nm. The Seebeck coefficient (S) of the samples was measured as a function of temperature. The Seebeck coefficient (Fig 1) Ba₁₋ₓLaₓSnO₃ is relatively higher than that of BaSnO₃ and Ba₁₋ₓSrₓSnO₃ especially at the high temperature.

Key Words: Perovskite, Thermoelectric, Seebeck coefficient, XRD, SEM, TEM.

![Seebeck Coefficient](image-url)