High-temperature thermoelectric properties of $Ca_{1-x}Pr_xMnO_{3-??}$ (0??x<1)

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Abstract: $Ca_{1-x}Pr_xMnO_{3-??}$ (x=0, 0.05, 0.15, 0.1, 0.2, 0.4, 0.67; ??=0.02) samples were prepared by a solid-state reaction method. X-ray diffraction analysis showed that all samples prepared were of single phase with orthorhombic structure. Electrical resistivity measurements from room temperature to 1300K showed that a metallic conducting tendency dominated at high temperatures. The hopping nature of the charge carriers was well interpreted in the framework of polaron theory. The Seebeck coefficient was measured in the same temperature interval, and its concentration dependence was analyzed using the high-temperature (HT) thermopower theory proposed by Marsh-Parris. The thermal conductivity and the figure of merit of the prepared samples were also compared with those of other similar perovskite compounds. The observed figure of merit of the sample with x=0.15 was $Z=1.5??10^{-4}K^{-1}$ at T=1100K, indicating a good potential for application as a HT thermoelectric material.

Author Keywords: $Ca_{1-x}Pr_xMnO_{2.98}$ perovskite; Electrical conductivity; Seebeck coefficient; Thermal conductivity; Thermoelectric properties

Index Keywords: Colossal magnetoresistance; Electric conductivity; High temperature effects; Sampling; Seebeck effect; X ray diffraction analysis; Ca1-xPrxMnO2.98 perovskite; Temperature interval; Thermoelectric properties; Thermopower theory; Calcium compounds

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