9C.5

High temperature thermoelectric properties of perovskite type $Pr_{0.9}Sr_{0.1}Mn_{1-x}Fe_xO_3$ ($0 \leqq x \leqq 1$)

Hiroshi Nakatsugawa[1,*], Miwa Saito[2], and Yoichi Okamoto[3]

[1]*Yokohama National University, 79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan*

[2]*Kanagawa University, 3-27-1 Rokkakubashi, Kanagawa-ku, Yokohama 221-8686, Japan*

[3]*National Defense Academy, 1-10-20 Hashirimizu, Yokosuka 239-8686, Japan*

**e-mail of presenting author: naka@ynu.ac.jp*

Polycrystalline samples of $Pr_{0.9}Sr_{0.1}Mn_{1-x}Fe_xO_3$ ($0 \leqq x \leqq 1$) were synthesized using a conventional solid-state reaction method. We investigated crystal structure, magnetic susceptibility, electrical resistivity, Seebeck coefficient, and thermal conductivity as a function of temperature. The perovskite structure at room temperature showed orthorhombic *Pbnm* phases for all samples. Although the sample for $Pr_{0.9}Sr_{0.1}MnO_3$ ($x = 0$) showed the ferromagnetic-like ground state below T_C = 145K (Curie temperature), the ferromagnetic-like ground state decreases with increasing x. Seebeck coefficient of the samples for $0 \leqq x \leqq 0.8$ decreases with increasing temperature because of the double exchange interaction on Mn ions. In fact, the carrier type for $x = 0$ changes from hole-like to electron-like behavior above 800K. On the other hand, the samples for $x \geqq 0.9$ show a large positive Seebeck coefficient over the whole temperature range. This means that the low spin sate of Fe ions dominates the electronic structure for $x \geqq 0.9$ In particular, the sample for $x = 1$ shows promising p-type thermoelectric properties with a relatively high Seebeck coefficient, moderate electrical resistivity and a temperature stable low thermal conductivity. For example, the sample for $x = 1$ showed a power factor of 61.8 μ $Wm^{-1}K^{-2}$ at 850K leading to a ZT value of about 0.05 at 850K.