18p-A7-10

Thermoelectric properties enhancement of a new silicide compound by cationic substitution

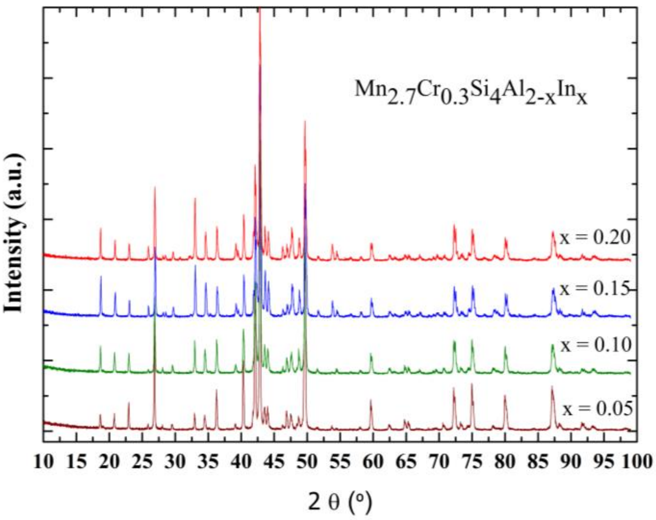
AIST Kansai, °(P)Tristan Barbier, Ryoji Funahashi, Emmanuel Combe, Tomonari Takeuchi and Masahiro Shikano

E-mail: tristan.barbier@aist.go.jp

Thermoelectric materials are of increasing interest for applications involving energy harvesting from waste heat. The efficiency of a thermoelectric device is dependent on the physical properties of the component materials. In particular, the thermoelectric performance of a material is dependent on an unusual combination of high electrical conductivity, typically found in metals, together with low thermal conductivity and high Seebeck coefficient, characteristics more usually associated with nonmetallic systems, and is embodied in the dimensionless figure of merit. Recently, there has been renewed interest in silicon-based thermoelectric compounds offer as low-cost alternatives to the current commercial material of choice, Bi_2Te_3 [1]. Indeed, we have recently shown that $Mn_{2.7}Cr_{0.3}Si_4Al_2$ is an attractive candidate, which possesses a high power factor values [2].

In the context of searching for efficient thermoelectric compounds, the Seebeck coefficient and the electrical conductivity of $Mn_{2.7}Cr_{0.3}Si_4Al_2$ can be optimized through substitutions and change in charge carrier concentration, so the power factor can be potentially increased in a specified temperature range.

For that purpose, cationic substitutions (In, Sb, Sn, Ge) on the Silicon and Aluminum sites were realized, presented and discussed in this presentation.



[1] T. M. Tritt and M. A. Subramanian, MRS Bulletin, 31 (2006).

[2] R. Funahashi *et al*., Journal of Applied Physics 112, 073713 (2012).