

The High-temperature Modification of LuAgSn and High-pressure High-temperature Experiments on DyAgSn, HoAgSn, and YbAgSn

Birgit Heying^a, Ute Ch. Rodewald^a, Gunter Heymann^b, Wilfried Hermes^a,
Falko M. Schappacher^a, Jan F. Riecken^a, C. Peter Sebastian^c, Hubert Huppertz^b, and
Rainer Pöttgen^a

^a Institut für Anorganische und Analytische Chemie, Universität Münster, Corrensstraße 30,
48149 Münster, Germany

^b Department Chemie und Biochemie, Ludwig-Maximilians-Universität München,
Butenandtstraße 5 – 13 (Haus D), 81377 München, Germany

^c Max-Planck-Institut für Chemische Physik fester Stoffe, Nöthnitzer Straße 40,
01187 Dresden, Germany

Reprint requests to R. Pöttgen. E-mail: pottgen@uni-muenster.de

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The high-temperature modification of LuAgSn was obtained by arc-melting an equiatomic mixture of the elements followed by quenching the melt on a water-cooled copper crucible. HT-LuAgSn crystallizes with the NdPtSb-type structure, space group $P6_3mc$: $a = 463.5(1)$, $c = 723.2(1)$ pm, $wR2 = 0.0270$, $151 F^2$, and 11 variables. The silver and tin atoms build up two-dimensional, puckered $[Ag_3Sn_3]$ networks (276 pm Ag–Sn) that are charge-balanced and separated by the lutetium atoms. The Ag–Sn distances between the $[Ag_3Sn_3]$ layers of 294 pm are much longer. Single crystals of isotypic DyAgSn ($a = 468.3(1)$, $c = 734.4(1)$ pm, $wR2 = 0.0343$, $411 F^2$, and 11 variables) and HoAgSn ($a = 467.2(1)$, $c = 731.7(2)$ pm, $wR2 = 0.0318$, $330 F^2$, and 11 variables) were obtained from arc-melted samples. Under high-pressure (up to 12.2 GPa) and high-temperature (up to 1470 K) conditions, no transitions to a ZrNiAl-related phase have been observed for DyAgSn, HoAgSn, and YbAgSn. HT-TmAgSn shows Curie-Weiss paramagnetism with $\mu_{\text{eff}} = 7.53(1) \mu_B/\text{Tm atom}$ and $\theta_p = -15.0(5)$ K. No magnetic ordering was evident down to 3 K. HT-LuAgSn is a Pauli paramagnet. Room-temperature ^{119}Sn Mössbauer spectra of HT-TmAgSn and HT-LuAgSn show singlet resonances with isomer shifts of 1.78(1) and 1.72(1) mm/s, respectively.

Key words: Intermetallics, Stannides, High-pressure Experiments