substance: Mn_nSi_{2n-m}
property: general characterization

The Mn_nSi_{2n-m} phases form by a peritectic reaction around 1550°C [66M] (earlier interpreted as congruent melting [64F]). In most cases the exact stoichiometry of the samples was not determined. Many samples probably contained a mixture of different Mn_nSi_{2n-m} phases as well as traces of metallic and paramagnetic MnSi [73L]. Mn_4Si_7 is metastable below 1125°C. On slow cooling it decomposes into $MnSi_{1.73}$ + interstitial Si. If all valence electrons are bonded in Mn_4Si_7, the interstitial silicon in the low temperature phase should act as an acceptor. This assumption is supported by the fact that the experimental hole density ($4.6 \cdot 10^{20}$ cm^{-3}) is roughly equal to the number of Frenkel defects ($6.5 \cdot 10^{20}$ cm^{-3}) [72U].

Reports on the magnetic properties of the Mn_nSi_{2n-m} phases are contradictory. According to [70M, 73L] the pure Mn_nSi_{2n-m} phases (all?) should be diamagnetic, but other authors report on antiferromagnetism [66S, 80N] and Curie-Weiss behavior [65R].

Electrical conductivity, Seebeck coefficient and thermal conductivity for different Si concentrations: Figs. 1...4.

References:

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80N Nakajima, T., Schelten, J.: J. Mag. Magn. Mater. 21 (1980) 157.

Fig. 1.

$MnSi_x$. Electrical conductivity vs. temperature for polycrystalline samples [72U].

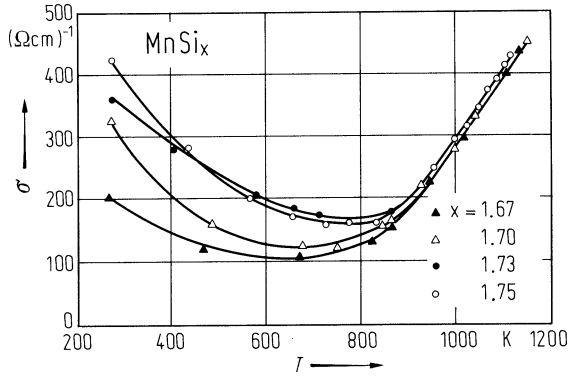

Fig. 2.

$MnSi_x$. Thermoelectric power vs. temperature for polycrystalline samples [72U].

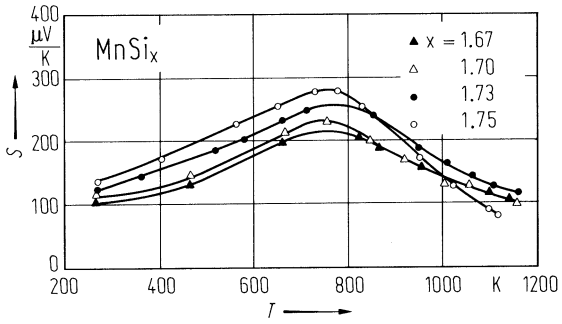

Fig. 3.

$MnSi_x$. Thermal conductivity vs. temperature for polycrystalline samples [72U].

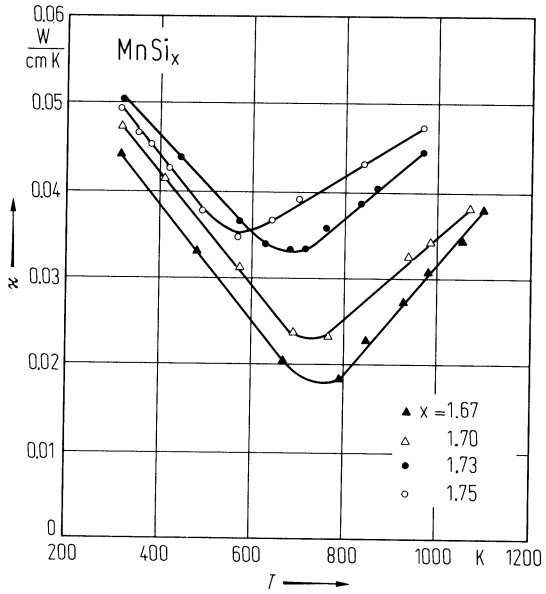

Fig. 4.

Mn_nSi_{2m-n}. Electrical conductivity and Seebeck coefficient vs. temperature for polycrystalline samples [61K]. Open symbols; $MnSi_{1.735}$ (47 wt% Si); full symbols: $MnSi_{1.770}$ (47.5 wt% Si).