

R₂Sn₃ (R = La – Nd, Sm): A Family of Intermetallic Compounds with their Own Triclinic Structure

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Dedicated to Prof. A. Iandelli on the occasion of his 90th birthday

A new family of intermetallic compounds with stoichiometry R₂Sn₃ has been identified in the R-Sn system for R = La, Ce, Pr, Nd and Sm. All compounds have a new triclinic crystal structure: $P\bar{1}$, $a = 6.378(1)$, $b = 8.422(1)$, $c = 11.098(1)$ Å, $\alpha = 107.37(1)^\circ$, $\beta = 96.78(1)^\circ$, $\gamma = 100.03(1)^\circ$ for Nd₂Sn₃. As a characteristic motif, the structure contains infinite chains of neodymium trigonal prisms centred by tin and sharing alternately a lateral face and an edge of a triangular face.

Heat capacity measurements reveal that the compounds with R = Ce, Pr, Nd and Sm order magnetically and undergo multiple magnetic transitions; from entropy considerations it appears that the four symmetry in-equivalent Ce atoms in Ce₂Sn₃ and the Sm atoms in Sm₂Sn₃ are all in the trivalent state. The highest transition temperature of nearly 24 K is observed for Sm₂Sn₃. The magnetisation and heat capacity data of La₂Sn₃ indicate a superconducting transition with a T_c of about 2.5 K.

Key words: Crystal Structure, Rare Earth Stannides, Heat Capacity, Magnetic Measurements