

Inverse Perovskites (RE_3N)Sn with $RE = La, Ce, Pr, Nd, Sm$: Preparation, Crystal Structures and Physical Properties

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Dedicated to Professor Wolfgang Jeitschko on the occasion of his 70th birthday

The ternary compounds (RE_3N)Sn with $RE = La, Ce, Pr, Nd, Sm$ were prepared starting from the elements. The compounds with $RE = La, Ce, Pr$ were obtained as single phase materials according to X-ray powder diffraction patterns, which also indicate the cubic inverse perovskite crystal structure (space group $Pm\bar{3}m$, La: $a = 509.48(2)$ pm, Ce: $a = 501.59(2)$ pm, Pr: $a = 497.53(2)$ pm, Nd: $a = 494.70(5)$ pm, Sm: $a = 488.35(9)$ pm). Chemical analyses proof the correct composition and particularly the absence of nonmetallic constituents next to nitrogen. All studied compounds show metallic characteristics in the electrical resistivity. Magnetic susceptibility measurements indicate (La_3N)Sn to be a Pauli-paramagnet. Initially observed superconductivity was traced down to be due to thin La films on the surface of the grains. The Ce and Pr containing compounds show the behavior of $4f^1$ ions and $4f^2$ ions, and order antiferromagnetically at 6.8(2) K and 48(1) K, respectively.

Key words: Nitrides, Inverse Perovskites, Rare-Earth Metal Compounds, Magnetic Susceptibility, Electric Resistivity