Nickel-deficient Stannides $Eu_2Ni_{2-x}Sn_5$ – Structure, Magnetic Properties, and Mössbauer Spectroscopic Characterization

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New nickel-deficient stannides $Eu_2Ni_{2-x}Sn_5$ were synthesized by induction melting of the elements in sealed tantalum tubes. The solid solution was studied by X-ray powder diffraction and two crystal structures were refined on the basis of X-ray diffractometer data: *Cmcm*, a = 466.03(4), b = 3843.1(8), c = 462.92(9) pm, $wR2$ = 0.0469, 692 F^2 values, 39 variables for $Eu_2Ni_{1.49(1)}Sn_5$ and a = 466.11(9), b = 3820.1(8), c = 462.51(9) pm, $wR2$ = 0.0358, 695 F^2 values, 39 variables for $Eu_2Ni_{1.35(1)}Sn_5$. This new structure type can be considered as an intergrowth structure of $CaBe_2Ge_2$- and CrB-related slabs. The striking structural motifs are nickel-centered square pyramids which are condensed *via* common corners and edges. The layers of condensed $NiSn_5$ units are separated by the europium atoms. The Ni1 sites within the $CaBe_2Ge_2$ slabs show significant defects which leads to split positions for one tin site. $Eu_2Ni_{1.50}Sn_5$ shows Curie-Weiss behavior and an experimental magnetic moment of 7.74(1) μ_B / Eu atom, indicating stable divalent europium, as is also evident from ^{151}Eu Mössbauer spectra. Antiferromagnetic ordering is detected at 3.5 K.

Key words: Europium, Stannide, Magnetic Properties, Mössbauer Spectroscopy