

# Synthesis and Structural Relationship of the Ternary Indides $\text{Sc}_3\text{Ni}_{2.10(5)}\text{In}_{3.60(5)}$ , $\text{Sc}_3\text{Ni}_{2.14(2)}\text{In}_{3.76(2)}$ , $\text{ScPd}_{0.981(2)}\text{In}$ and $\text{Sc}_3\text{Rh}_{1.594(9)}\text{In}_4$

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*Dedicated to Professor Ingo-Peter Lorenz on the occasion of his 60<sup>th</sup> birthday*

The ternary scandium transition metal indides  $\text{Sc}_3\text{Ni}_{2.10(5)}\text{In}_{3.60(5)}$ ,  $\text{Sc}_3\text{Ni}_{2.14(2)}\text{In}_{3.76(2)}$ ,  $\text{ScPd}_{0.981(2)}\text{In}$ , and  $\text{Sc}_3\text{Rh}_{1.594(9)}\text{In}_4$  have been synthesized from the elements in glassy carbon crucibles in a high frequency furnace or by arc-melting. They have been investigated by X-ray powder diffraction and the structures refined on the basis of single crystal diffractometer data:  $\text{Lu}_3\text{Co}_{1.87}\text{In}_4$  type,  $P\bar{6}$ ,  $a = 745.7(1)$ ,  $c = 342.85(7)$  pm,  $wR2 = 0.0689$ , 545  $F^2$ , 24 parameters for  $\text{Sc}_3\text{Ni}_{2.10(5)}\text{In}_{3.60(5)}$ ,  $a = 753.63(7)$ ,  $c = 344.3(1)$  pm,  $wR2 = 0.0362$ , 792  $F^2$ , 22 parameters for  $\text{Sc}_3\text{Ni}_{2.14(2)}\text{In}_{3.76(2)}$ ,  $P\bar{6}2m$ ,  $\text{ZrNiAl}$  type,  $a = 764.1(2)$ ,  $c = 345.90(8)$  pm,  $wR2 = 0.0333$ , 326  $F^2$ , 15 parameters for  $\text{ScPd}_{0.981(2)}\text{In}$ , and  $P\bar{6}$ ,  $a = 769.4(1)$ ,  $c = 684.1(1)$  pm,  $wR2 = 0.0526$ , 1097  $F^2$ , 35 parameters for the new structure type  $\text{Sc}_3\text{Rh}_{1.594(9)}\text{In}_4$ . In the three structure types the scandium atoms build trigonal prisms. The latter are filled exclusively by palladium atoms in  $\text{ScPd}_{0.981(2)}\text{In}$ , while transition metal and indium atoms fill these sites in the other three structures. The different coloring of the trigonal prismatic sites leads to a symmetry reduction for the structures of  $\text{Sc}_3\text{Ni}_{2.10(5)}\text{In}_{3.76(5)}$ ,  $\text{Sc}_3\text{Ni}_{2.14(2)}\text{In}_{3.76(2)}$  and  $\text{Sc}_3\text{Rh}_{1.594(9)}\text{In}_4$ . The structural relationship is described on the basis of a group-subgroup scheme. Chemical bonding in these intermetallics is briefly discussed.

*Key words:* Indium, Crystal Structure, Scandium