New Indides $\text{Sc}_6\text{Co}_{2.18}\text{In}_{0.82}$, $\text{Sc}_{10}\text{Ni}_9\text{In}_{19.44}$ and $\text{ScCu}_4\text{In}$ – Synthesis, Structure, and Crystal Chemistry

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Z. Naturforsch. 61b, 942 – 948 (2006); received May 9, 2006

New indides $\text{Sc}_6\text{Co}_{2.18}\text{In}_{0.82}$, $\text{Sc}_{10}\text{Ni}_9\text{In}_{19.44}$ and $\text{ScCu}_4\text{In}$ have been synthesized from the elements by arc-melting. Single crystals were grown by special annealing modes. The thee indides were investigated via X-ray powder and single crystal diffraction: $\text{Ho}_6\text{Co}_2\text{Ga}$ type, $\text{Immm}$, $a = 886.7(3)$, $b = 878.0(2)$, $c = 932.1(3)$ pm, $wR2 = 0.0517$, $711 F^2$ values, 35 variables for $\text{Sc}_6\text{Co}_{2.18}\text{In}_{0.82}$, $\text{Ho}_{10}\text{Ni}_9\text{In}_{20}$ type, $P4/nmm$, $a = 1287.5(2)$, $c = 884.7(1)$ pm, $wR2 = 0.0642$, 1221 $F^2$ values, 63 variables for $\text{Sc}_{10}\text{Ni}_9\text{In}_{19.44}$, and $\text{MgCu}_4\text{Sn}$ type, $F\bar{4}3m$, $a = 704.03(7)$ pm, $wR2 = 0.0267$, 101 $F^2$ values, and 7 variables for $\text{ScCu}_4\text{In}$. The scandium rich indide $\text{Sc}_6\text{Co}_{2.18}\text{In}_{0.82}$ contains two Co2 dumb-bells at Co–Co distances of 221 and 230 pm. Each cobalt atom within these dumb-bells has a tricapped trigonal prismatic coordination. The In1 site has a distorted cube-like coordination by scandium and shows a mixed occupancy (36%) with cobalt. The In2 atoms have distorted icosahedral scandium coordination. As a consequence of the small size of the scandium atoms, the In4 site in $\text{Sc}_{10}\text{Ni}_9\text{In}_{19.44}$ shows defects and was furthermore refined with a split model leading to a new distorted variant within the family of $\text{Ho}_{10}\text{Ni}_9\text{In}_{20}$ compounds. $\text{ScCu}_4\text{In}$ is an ordered version of the cubic Laves phase with scandium and indium atoms in the CN16 voids of the copper substructure. The Cu–Cu distances within the three-dimensional network of corner-sharing tetrahedra are 248.6 and 249.2 pm. The crystal chemical peculiarities of these three indide structures are briefly discussed.

Key words: Scandium, Intermetallics, Crystal Chemistry, Chemical Bonding