Transition Metal-centered Trigonal Prisms as Building Units in $RE_{14}T_3In_3$
($RE = Y, Ho, Er, Tm, Lu; T = Pd, Ir, Pt$) and $Y_4IrIn$

Roman Zaremba, Ute Ch. Rodewald, and Rainer Pöttgen

Institut für Anorganische und Analytische Chemie, Universität Münster, Corrensstraße 30,
D-48149 Münster, Germany

Reprint requests to R. Pöttgen. E-mail: pottgen@uni-muenster.de


The indides $RE_{14}T_3In_3$ ($RE = Y, Ho, Er, Tm, Lu; T = Pd, Ir, Pt$) and $Y_4IrIn$ were synthesized from the elements by arc-melting and subsequent annealing for crystal growth. Their structures were characterized on the basis of X-ray powder and single crystal data: Lu$_{14}$Co$_3$In$_3$-type, space group $P4_2/nmc$, $a = 970.2(1)$, $c = 2340.7(5)$ pm for $Y_{13.95}Pd_3In_{3.05}$, $a = 959.7(1)$, $c = 2309.0(5)$ pm for Ho$_{14}$Pd$_{2.95}$In$_3$, $a = 955.5(1)$, $c = 2305.1(5)$ pm for Er$_{14}$Pd$_3$In$_3$, $a = 950.9(1)$, $c = 2291.6(5)$ pm for Tm$_{13.90}$Pd$_3$In$_3$, $a = 944.4(1)$, $c = 2275.5(5)$ pm for Lu$_{13.93}$Pd$_3$In$_{3.07}$, $a = 962.9(1)$, $c = 2343.0(5)$ pm for Y$_{13.86}$Ir$_{2.97}$In$_{3.02}$, $a = 967.6(1)$, $c = 2347.8(5)$ pm for Y$_{13.92}$Pt$_{3.05}$In$_{2.91}$, and Gd$_4$RhIn-type, space group $F43m$, $a = 1368.6(2)$ pm for $Y_4IrIn$. The main structural motifs are transition metal-centered trigonal prisms of the rare earth elements which are condensed to two-dimensional networks in the $RE_{14}T_3In_3$ indides and to a three-dimensional one in $Y_4IrIn$. The indium atoms in both structure types show segregation in the metal-rich matrix, i.e. In$_2$ dumbbells in the $RE_{14}T_3In_3$ indides (309 pm In–In in $Y_{13.86}Ir_{2.97}In_{3.02}$) and In$_4$ tetrahedra (322 pm In–In) in $Y_4IrIn$. The crystal chemical peculiarities of both structure types are discussed.

Key words: Metal-rich Compounds, Intermetallics, Crystal Structure