On the Solid Solutions $Eu_{1-x}Pt_2In_x$, $Gd_{1-x}Pt_2In_x$, and $Tm_{1-x}Ni_2In_x$

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The binary cubic Laves phases $EuPt_2$, $GdPt_2$, and $TmNi_2$ form extended solid solutions $Eu_{1-x}Pt_2In_x$, $Gd_{1-x}Pt_2In_x$, and $Tm_{1-x}Ni_2In_x$. Samples within these homogeneity ranges have been prepared from the elements by arc-melting on water-cooled copper chills or by induction melting in sealed tantalum tubes and subsequent annealing. The indides were characterized by X-ray powder and single crystal diffraction: $MgCu_2$ type, $Fd\bar{3}m$, $a = 770.68(6)$ pm, $wR2 = 0.0251$, 67 F^2 values, 6 variables for $Eu_{0.94(3)}Pt_2In_{0.06(3)}$, $a = 769.16(6)$ pm, $wR2 = 0.0244$, 67 F^2 values, 6 variables for $Eu_{0.85(2)}Pt_2In_{0.15(2)}$, $a = 760.12(9)$ pm, $wR2 = 0.0693$, 65 F^2 values, 6 variables for $Gd_{0.79(5)}Pt_2In_{0.21(5)}$, and $MgCu_4Sn$ type, $F\bar{4}3m$, $a = 700.27(6)$ pm, $wR2 = 0.0368$, BASF $= 0.13(2)$, 175 F^2 values, 8 variables for $TmNi_4In$. The platinum and nickel atoms build up three-dimensional networks of corner-sharing $Pt_{4/2}$ and $Ni_{4/2}$ tetrahedra. These networks leave larger voids of coordination number 16 that are filled with the rare earth (*RE*) and the indium atoms. While the thulium and indium atoms are ordered in $TmNi_4In$, one observes mixed *RE*/In occupancies in $Eu_{0.94(3)}Pt_2In_{0.06(3)}$, $Eu_{0.85(2)}Pt_2In_{0.15(2)}$, and $Gd_{0.79(5)}Pt_2In_{0.21(5)}$.

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