The gold-rich indide $\text{Eu}_5\text{Au}_{17.7}\text{In}_{4.3}$ and its Relation with the Structures of $\text{SrAu}_{4.76}\text{In}_{1.24}$ and $\text{BaLi}_4$

Ihor Muts$^{a,b}$, Ute Ch. Rodewald$^a$, Vasyl’ I. Zaremba$^b$, Orest Pavlosyuk$^b$, and Rainer Pöttgen$^a$

$^a$ Institut für Anorganische und Analytische Chemie, Universität Münster, Corrensstraße 30, 48149 Münster, Germany
$^b$ Inorganic Chemistry Department, Ivan Franko National University of Lviv, Kyryla and Mephodiya Street 6, 79005 Lviv, Ukraine

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

$\textbf{Z. Naturforsch.} \textbf{2012}, \textbf{67b}, 107–112; \text{received February 13, 2012}$

The gold-rich indide $\text{Eu}_5\text{Au}_{17.7}\text{In}_{4.3}$ was synthesized from the elements in a sealed tantalum ampoule that was heated in a high-frequency furnace. $\text{Eu}_5\text{Au}_{17.7}\text{In}_{4.3}$ crystallizes with a new monoclinic structure type: $C2/m$, $a = 902.7(2)$, $b = 722.8(3)$, $c = 1734.1(4)$ pm, $\beta = 94.31(3)^\circ$, $wR^2 = 0.0907$, 2640 $F^2$ values and 74 variables. $\text{Eu}_5\text{Au}_{17.7}\text{In}_{4.3}$ has a pronounced gold substructure with Au–Au distances ranging from 278 to 300 pm. The striking structural motifs in the gold substructure are networks of $\text{Au}_6$ hexagons and discrete units of corner- and edge-sharing $\text{Au}_4$ tetrahedra. $\text{Eu}_5\text{Au}_{17.7}\text{In}_{4.3}$ exhibits a small homogeneity range with In/Au mixing on two Wyckoff sites. Geometrically, the $\text{Eu}_5\text{Au}_{17.7}\text{In}_{4.3}$ structure can be explained as an intergrowth variant of slightly distorted $\text{SrAu}_{4.76}\text{In}_{1.24}$ and $\text{BaLi}_4$-related slabs. The europium coordination in the $\text{BaLi}_4$ slabs is similar to binary $\text{EuAu}_2$.

**Key words:** Intermetallics, Europium, Indide, Gold Clusters