

Ternary Indides *REMgIn* (*RE* = Y, La–Nd, Sm, Gd–Tm, Lu). Synthesis, Structure and Magnetic Properties

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The equiatomic rare earth-magnesium-indium compounds *REMgIn* (*RE* = Y, La–Nd, Sm, Gd–Tm, Lu) were prepared from the elements in sealed tantalum tubes inside a water-cooled sample chamber of an induction furnace. All compounds were characterized through their X-ray powder patterns. They crystallize with the hexagonal ZrNiAl type structure, space group $P\bar{6}2m$, with three formula units per cell. The structure of SmMgIn was refined from X-ray single crystal diffractometer data: $a = 761.3(2)$, $c = 470.3(1)$ pm, $wR2 = 0.0429$, 380 F^2 values and 14 variable parameters. The DyMgIn, HoMgIn, and TmMgIn structures have been analyzed using the Rietveld technique. The *REMgIn* structures contain two crystallographically independent indium sites, both with tri-capped trigonal prismatic coordination: $\text{In1Sm}_6\text{Mg}_3$ and $\text{In2Mg}_6\text{Sm}_3$. Together the magnesium and indium atoms form a three-dimensional [MgIn] network with Mg–Mg distances of 320 and Mg–In distances in the range 294 – 299 pm. Temperature dependent magnetic susceptibility data show Curie-Weiss behavior for DyMgIn, HoMgIn, and TmMgIn with experimental magnetic moments of 11.0(1) μ_B /Dy atom, 10.9(1) μ_B /Ho atom, and 7.5(1) μ_B /Tm atom. The three compounds order antiferromagnetically at $T_N = 22(2)$ K (DyMgIn), 12(1) K (HoMgIn), and 3(1) K (TmMgIn).

Key words: Rare Earth Compounds, Crystal Chemistry, Magnetochemistry