Structural, Magnetic and Electrical Properties of the Ternary Silicide $Gd_6Co_{1.67}Si_3$ Derived from the Hexagonal $Ho_4Co_{3.07}$ (or $Ho_6Co_{4.61}$) Type Structure

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The title compound was discovered as an impurity phase in many GdCoSi samples. It crystallizes in the hexagonal space group $P6_3/m$ with $a = 11.7787(5)$ and $c = 4.1640(2)$ Å. Using X-ray powder diffraction, an ordered distribution between Co and Si was found but one site is not fully occupied by Co for steric reasons. Magnetization measurements reveal that $Gd_6Co_{1.67}Si_3$ exhibits a ferromagnetic transition at $T_C = 294(2)$ K, a Curie temperature similar to that reported for pure gadolinium. This magnetic ordering has been confirmed by electrical resistivity investigations.

Key words: Rare-Earth Intermetallics, Electron Microscopy, Crystal Chemistry of Intermetallics, Magnetic Properties, Electrical Resistance