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CeRh₂Al₁₀ – the first rhodium aluminide with a new structure type in the 1:2:10 stoichiometry family

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Abstract

A new member of the RET₂Al₁₀ family was synthesized and its crystal structure was determined from single crystal X-ray diffraction. The first aluminide with rhodium adopts a new structure type of **1:2:10 stoichiometry**. CeRh₂Al₁₀ crystallizes in the tetragonal space group *I4₁/amd* with cell parameters *a*=8.9284(11) Å and *c*=21.769(3) Å and is a substitution variant of CePd₃Al₉ compound. The mutual arrangement of Rh and Al neighbors within the 20-vertex Ce polyhedron differs in comparison with that of the CeRu₂Al₁₀ structure. This leads to the different packing of Ce polyhedra in the unit cell. In CeRh₂Al₁₀, zig-zag chains of the shortest Ce-Ce contacts extend in the two mutually perpendicular directions – along the *a*-axis and along the *b*-axis. In contrast, in CeRu₂Al₁₀, zig-zag chains of the shortest Ce-Ce contacts run in one direction – along the *c*-axis. We illustrate using key physical properties how the variation in crystal structure produces physical properties in CeRh₂Al₁₀ that differ strikingly from the situation in CeRu₂Al₁₀.

Keywords: A. rare earth alloys and compounds; C. crystal structure, magnetization, electrical resistivity, specific heat; D. X-ray diffraction

Introduction

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