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Crystal Structures and Phase Transitions of the Gold-Rich Gold-Cadmium Alloy*

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Abstract

The gold-cadmium alloys in the composition range between 23 and 29 at.% cadmium were studied by X-ray diffraction and by measurements of specific heat and electrical resistance. By means of an X-ray single crystal diffraction method, it was confirmed that the ordered alloy Au₃Cd (α₁ phase) has a one-dimensional anti-phase domain structure of the Ag₃Mg type exhibiting a face-centered tetragonal fundamental cell \( a = 4.116 \text{Å}, c/a = 1.005 \) (24.6 per cent Cd). It was also established that a regular arrangement of stacking faults exists in the hexagonal α₂ phase of the 25.5% Cd alloy. Changes of specific heat and electrical resistance due to the order-disorder transition of the alloy Au₃Cd as well as those due to the lattice transition from hexagonal (α₃) to cubic (α) were measured. The results are qualitatively discussed in connection with the structure of these phases.