

A high Pressure high Temperature Study of Co-rich d-Al-Co-Ni

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A basic key in the understanding of the stabilization mechanisms of quasicrystals is the knowledge of their stability ranges within the p-T field. In the last decade, the Al-Co-Ni system has become the model system for the study of decagonal quasicrystals [1]. The decagonal phase in this system shows a quite large compositional stability range, going along with changes of the structural disorder and the formation of superstructures as a function of temperature.

Ni-rich decagonal quasicrystals were found to be stable within the applied experimental frameworks ($\text{Al}_{72}\text{Co}_8\text{Ni}_{20}$ up to 70 GPa from powder [2], $\text{Al}_{70}\text{Co}_{12}\text{Ni}_{18}$ up to 10 GPa from single crystal [3], both at ambient temperature). The Co-rich decagonal phase was not yet studied at non-ambient conditions. This phase is neighbored by the recently discovered W-phase [4], which is the highest approximant phase in the Al-Co-Ni system, and therefore the structural behavior of this decagonal phase at non-ambient conditions is of special interest.

The results of an in-situ high pressure high temperature study on $\text{Al}_{73}\text{Co}_{21}\text{Ni}_6$ up to about 16 GPa and 973 K will be discussed.

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