TRANSFORMATION OF THE STRUCTURE OF INTERMETALLIC ALLOYS AFTER MELTING

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Subject of research :

- whether the structural ordering of intermetallics is preserved in the liquid state

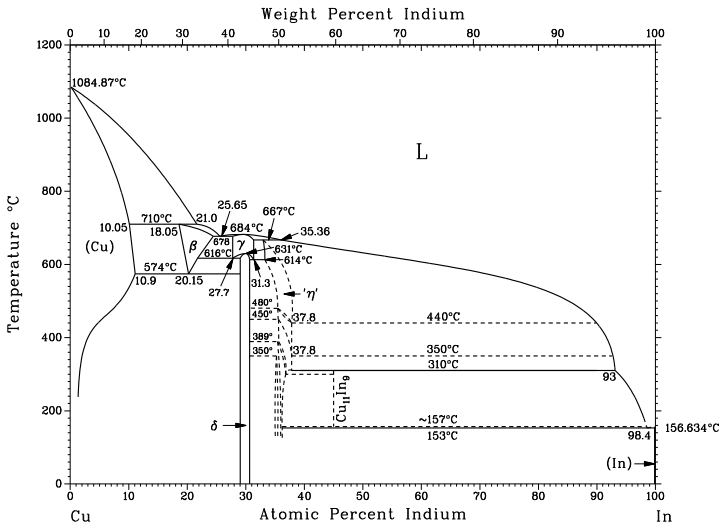
- what is the temperature stability of the chemical short order?

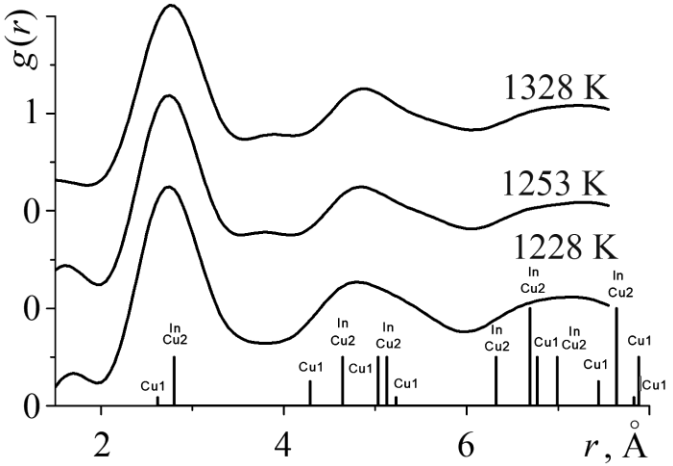
- degree of structural changes in the liquid state (lattice stability)

- concentration dependence of the structure (whether there is a region of homogeneity or concentration stability of the structure?)

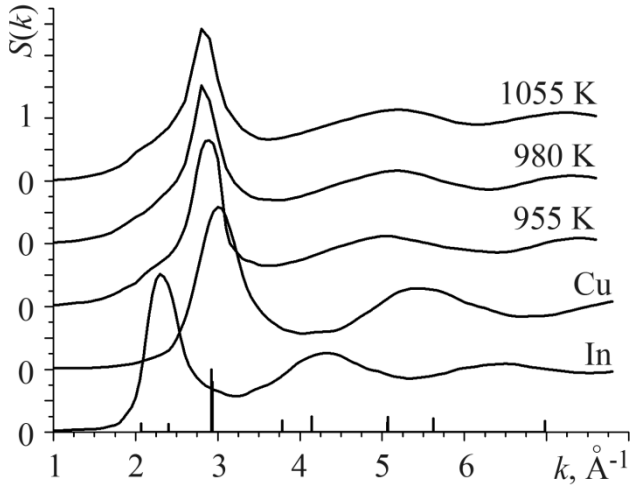
- the relationship of thermal stability with the nature of the maximum on the liquidus line.

Phase Diagram of the Cu-In System

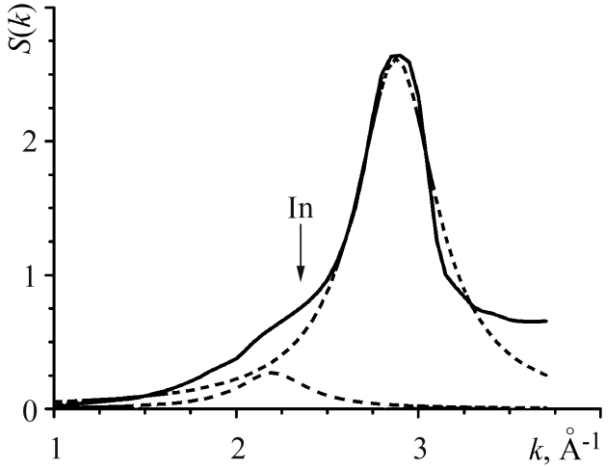




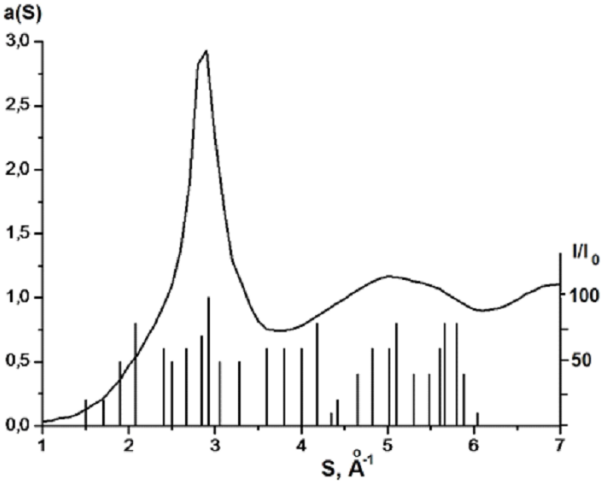
Position of the maxima of the experimental pairwise functions of the atomic distribution in comparison with the distances to the nearest atoms in crystalline Cu_2In.



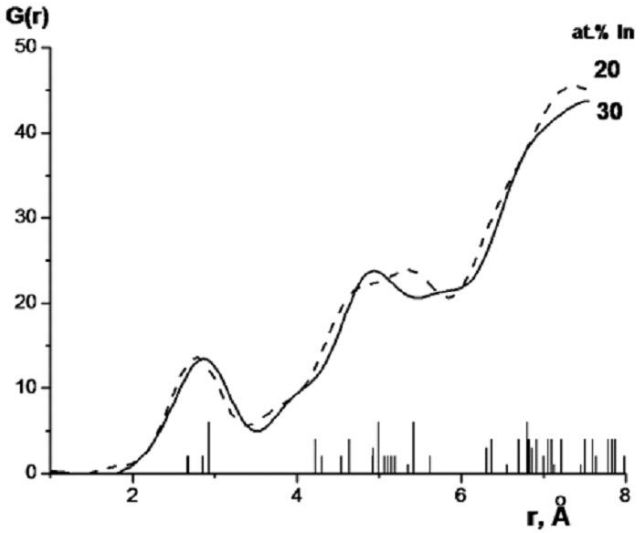
SF melts of In, Cu and Cu66,7In33,3 and the position of the most intense reflexes for the crystalline intermetallic Cu2In (vertical lines).



Interpretation of the main SF maximum of the Cu66.7In33.3 melt at 1228 K as the additive sum of two Gaussian curves (dashed lines).



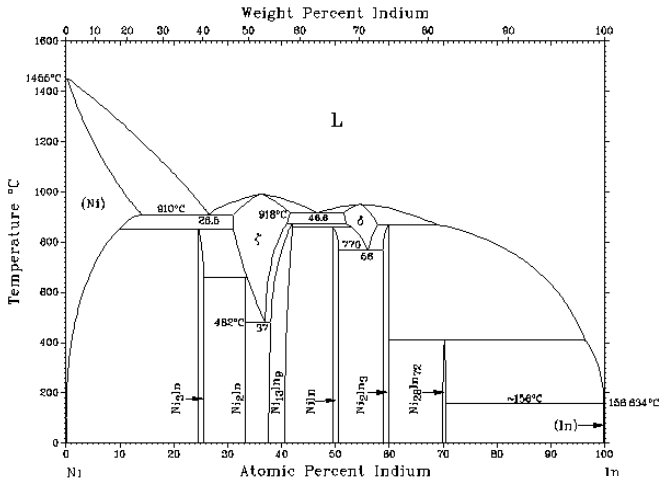
Structural factor and diffraction reflexes of Cu_9In_4

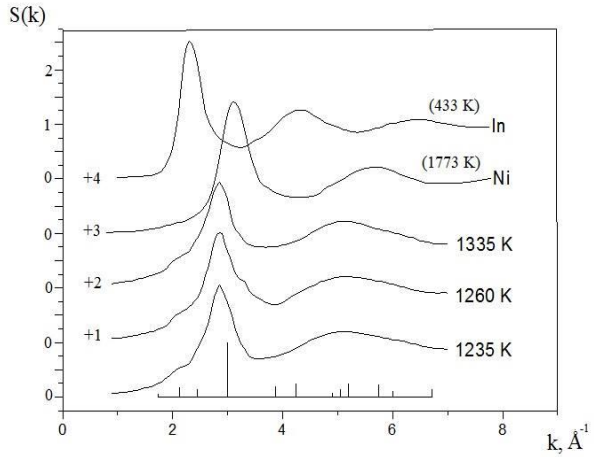


Radius of coordination spheres and coordination numbers of Cu_9In_4 compound in comparison with FRDA of Melts of Cu-In system

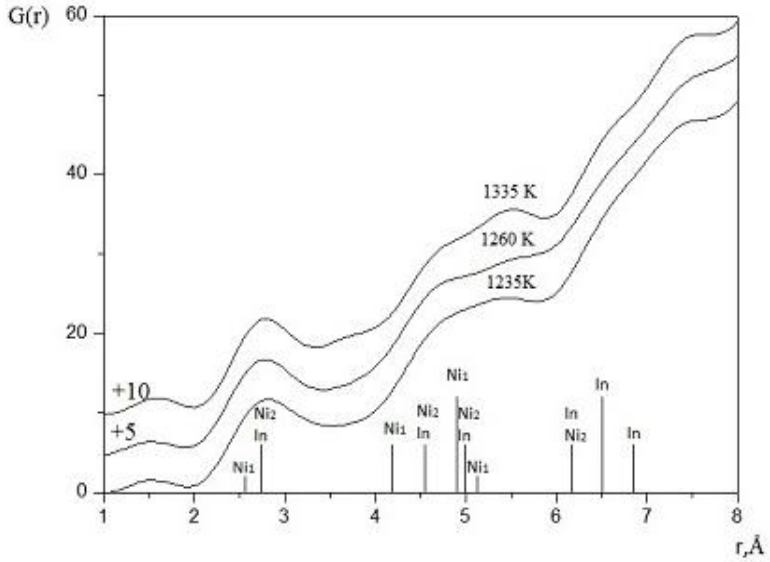
The structure of the $Cu_{66,6}In_{33,3}$ melt is characterized by a heterocoordinated distribution of atoms with the topology of the atomic distribution to the structure of the crystalline phase of Cu_2In. In a matrix with this type of structure, clusters based on indium atoms are also formed, which leads to a microhomogeneous structure not only near the onset temperature of crystallization, but also in a certain temperature range above the liquidus point (100K). The results of structural studies correlate with the literature data on the measurement of thermodynamic properties

Phase Diagram of the Ni-In System

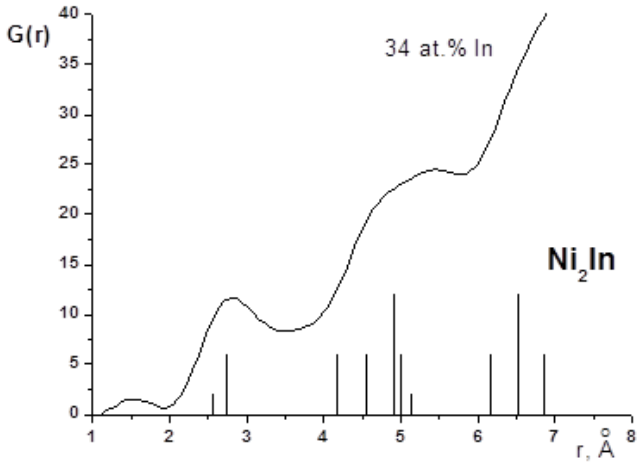


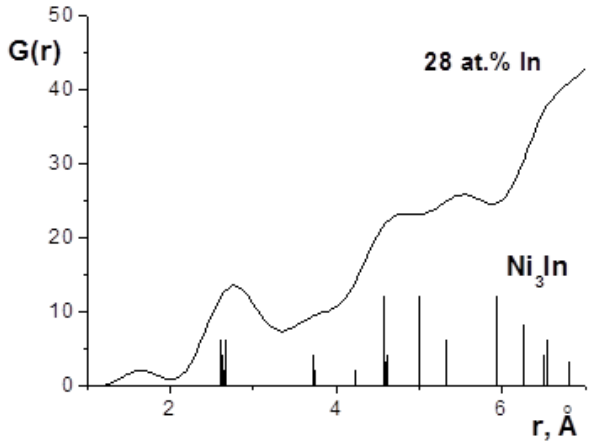


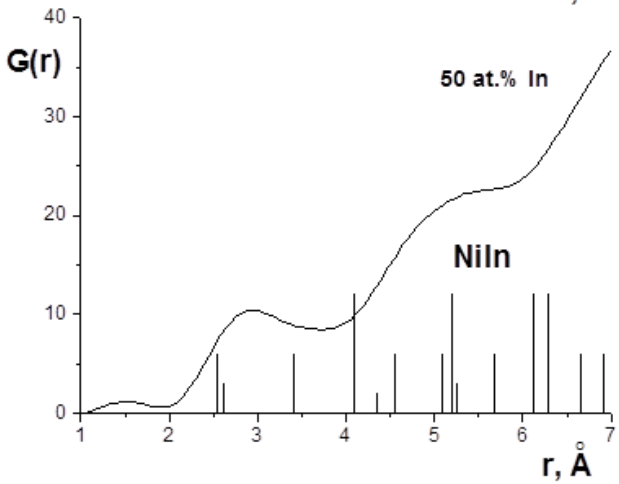
Structural factors of the melt
and diffraction reflexes of the compound Ni_2In.

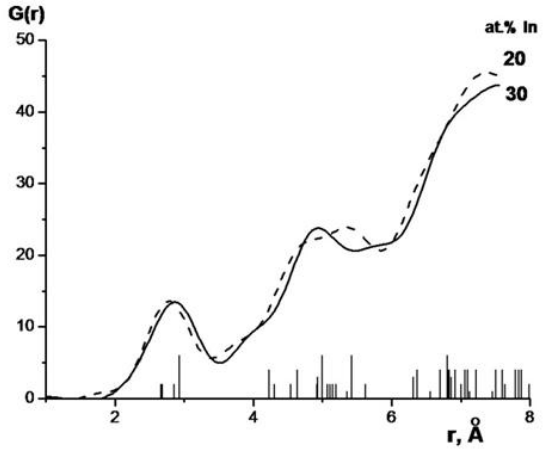


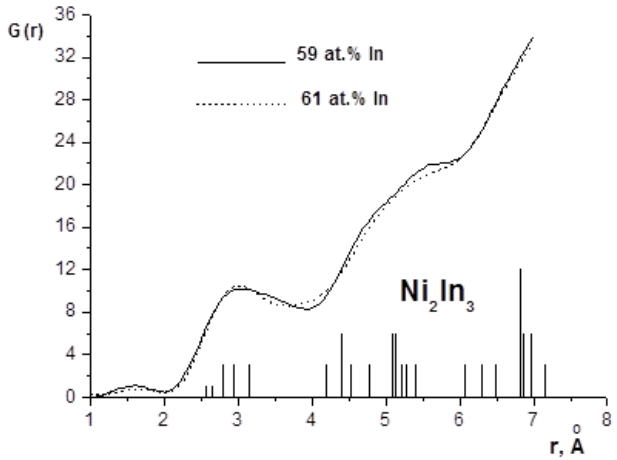
Position of maxima in experimental functions of radial distribution in comparison with distances to the nearest atoms in crystalline Ni_2In











1. Liquid alloy Ni66,7In33,3 has an atomic distribution, the main feature of which is the presence of chemical ordering of atoms that have high thermal stability of the structure.

2. The short order in the liquid state has similar parameters to the Ni2In crystal cell. The atomic distribution in the Ni66,7In33,3 melt assumes its insignificant transformation during crystallization, when the ε - phase is formed.