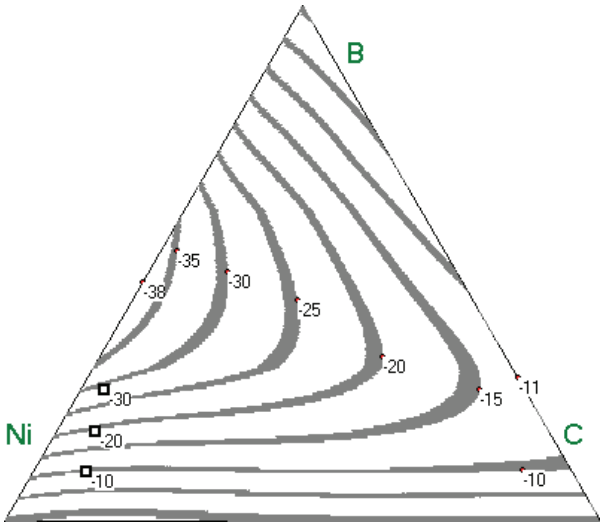
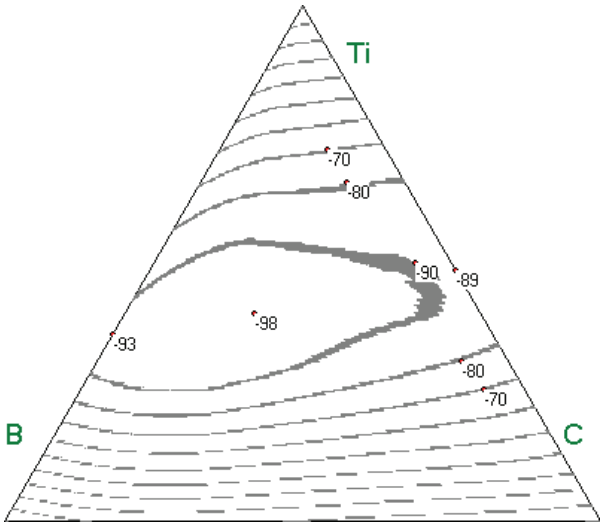
THERMODYNAMIC PROPERTIES AND PHASE DIAGRAMS OF TERNARY Me-B-C SYSTEMS

Kudin V.G., Makara V.A., Sudavtsova V.S., Shevchenko M.A.
Kiev National University, Department of Chemistry
E-mail: vsudavtsova@univ.kiev.ua

Alloys containing boron and carbon, have high hardness, heat resistance, and therefore are widely used in industry. Thermodynamic properties of such systems are studied insufficiently, since they are complex objects of study, therefore, it is useful to calculate the data of the binary systems. Using literature and our data, we can calculate the thermodynamic properties of ternary systems of metal-B-C in the whole concentration range. For example, given mixing isoenthalpies in melts of Ni-B-C:

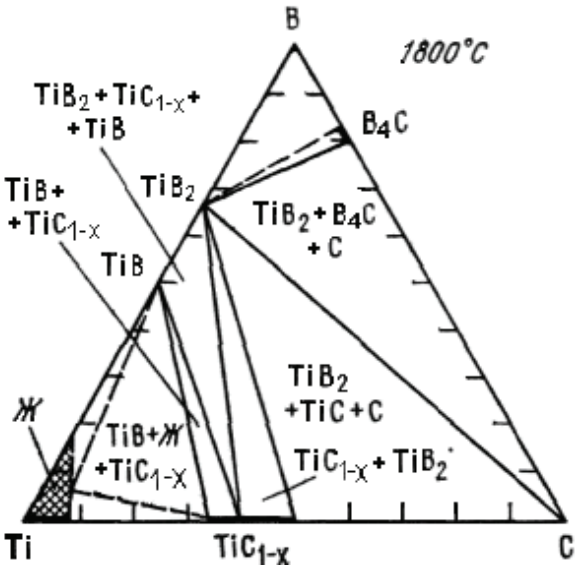




Similar calculations are done for a number of 3d-metal-B-C systems. We can see that the experimental and calculated values agree well. The above are isoenthalpies for melts of Ti-B-C system, which have not yet been explored experimentally, but they are of considerable interest as an object for thermodynamic properties modeling.

We see that in the Ti-B-C system is very high heat of liquid alloys forming, due to strong interactions Ti-C and Ti-B. Minimum of integral mixing enthalpy is on the quasibinary section Ti-C - $Ti-B_2$.

We also calculated isothermal sections of phase diagrams from thermodynamic properties by the Calphad method. They correlate with the experimentally established. This shows that the calculated thermodynamic properties correctly reflect the nature of the melts of this system:



Thus, the properties of ternary systems which are difficult to study can be correctly predicted using the data for the binary boundary systems.