

REFINEMENT OF THE MELTING DIAGRAM OF THE «Ti-AL-N» AND «W-AL-N» SYSTEMS USING COMBUSTION DATA CLOUD ANALYSIS

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A study of the combustion of the SHS systems "«Ti-Al-N» and «W-Al-N» was carried out. It was found that the shape and outline of the "cloud" of these combustion parameters coincide with the shape and outline of the region bounded by the liquidus and solidus lines of the double phase diagrams "Me1-Me2".

It is possible to construct a hypothetical diagram of the state of the «Ti-B» system using the analysis of the combustion parameters of the «Ti-Me-B» triple system [1]. The combustion parameters correspond to the properties of the solid-liquid medium formed in the zone of chemical reactions of the combustion wave, with a temperature lying between the temperatures "L" and "S" of the corresponding double phase diagrams "Me1-Me2". By changing the initial synthesis parameters (composition, density, powder dispersion, etc.), we change the properties of the medium (viscosity, size of solid particles in suspension, nitrogen flow rate, etc.). Different properties of the environment determine different types of formation of intermediate unstable nitrides [2 – 6].

Combustion in SHS mode was carried out in a constant pressure reactor under a nitrogen of 20 atm.

Figure 1 (a) shows a combined diagram for the "W-Ti" system, with a cloud of experimental data η of combustion of the "W-Ti-N" system. The lower envelope exactly coincided with the course of the solidus line. Figure 1 (b, c) shows a combined known "Al-Ti" fusibility diagram with experimental data on the degree of conversion η , which are located in the region of the absence of a solid-liquid melting zone, which according to the proposed phase formation mechanism cannot exist. Therefore, in Fig. 1 (c), another version of the section of the fusibility diagram is proposed.

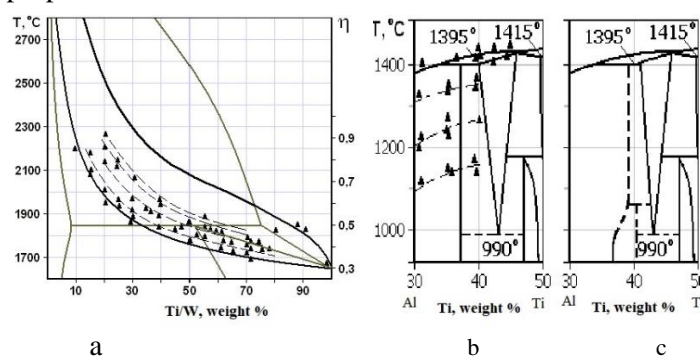


Figure 1. Combined fusibility diagram "Ti-W" with a "cloud" of data η (a). Combined known "Al-Ti" fusibility diagram with data cloud η (b) and estimated (c)

A different location of the liquidus and solidus lines in the "Al-W" and "Al-Ti" fusibility diagrams has been proposed. It is shown that the shape and outline of the "clouds" of these combustion parameters of the SHS system "Me1-Me2-N" repeat the region of the zone between "L" and "S" of the double diagrams "Me1-Me2".

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