

# CONNECTION OF THE COMBUSTION PROCESS OF SHS SYSTEM "TI-CO-N" WITH THE STATE DIAGRAM

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Self-propagating high-temperature synthesis (SHS) of the Ti-Co-N system was investigated in the work and the relationship of combustion parameters with the state diagram was found. The zone of chemical reactions for combustion is a solid-liquid melt, which receives nitrogen gas corresponding to the "L-S" melt of the state diagram. All the obtained parameters of the combustion system under different initial conditions characterize the behavior of the high-temperature chemically active solid-liquid environment [1-3]. The work goal is to analyze the variation of different initial parameters, to clarify the mechanism of phase formation during the reaction, the relationship of the phase composition of the combustion product with the type of intermediate unstable nitrides [4] formed in the combustion wave and the diagram of the system state.

SHS of samples (diameter 20 mm, weight 16 g.) of bulk density and pressed samples was carried out in a constant pressure reactor. The relative density varied from 0.22 to 0.38. The initial composition changed in the ratio: Co/Ti % weight. within 5/50 values. The final products were studied using RFA analysis. Changes in the concentration of the environment, the rate of nitrogen flow, and the rate of combustion of samples were obtained by changing the initial parameters (initial concentration of substances, initial density of samples, diameter, height of samples, etc.)

When the powder of one metal is heated to a temperature above solidus, a pure melt is formed, which prevents the penetration of nitrogen to the reaction zone. The vortex motion that delivers nitrogen gas to the reaction zone is formed in a multi-density medium at high temperatures. Regardless of the start composition, dispersity of powders, the density of the sample, the values of the combustion parameters as completeness of conversion ( $\eta$ ), the maximum temperature of combustion, the amount of stoichiometric absorbed of nitrogen, obtained in the experiment lie in the region between the lines of solidus and liquidus, i.e. in the area of solid-liquid suspension, or are define by the area. The values for the fullness of the transformation filled a space that completely coincided with the space bounded by the liquidus and solidus lines. This means that the SHS processes take place only within the solid-liquid melt "L-S". Each trajectory corresponds to the same size of solid particles in the "L-S" melt, as spaced at the same distance from the liquidus line, as shown in figure 1.

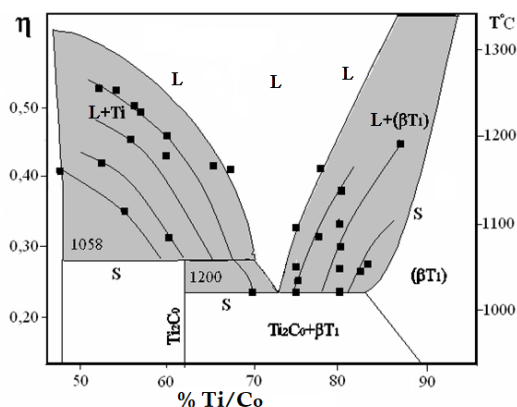


Fig.1. Диаграмма плавокости системы «Ti-Co», совмещенная с «облаком» экспериментальных данных

Acknowledgements: The blessed memory of Raskolenko Larisa G. whose ideas are the basis of this work. Peleneva S. P. for assistance in the experiments.

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