USING THE WAVELET TRANSFORM FOR MECHANICAL ACTIVATION AND THERMAL EXPLOSION OF A TI – NI MIXTURE

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Experimental results of mechanical activation (MA) of a powder mixture of titanium and nickel, and subsequent self-propagating high -temperature synthesis (SHS) in the mode of thermal explosion with the formation of synthesized products are considered in the paper.

Analyses of graphs of various dependencies, diagrams constructed from experimental data at MA and when studying various temperature characteristics of a thermal explosion are carried out. The self-consistent system under study is suitable for microfractal calculations [1, 2], since it meets the conditions: the system has a limit value of the MA time at which this system exists and remains holistic. All existing processes in the system are subject to two main processes of opposite nature, relaxation and tension processes. They always work together, simultaneously, helping the system achieve its goal. For fig.1 shows the frequency diagram of the fraction size after grinding in a planetary mill.

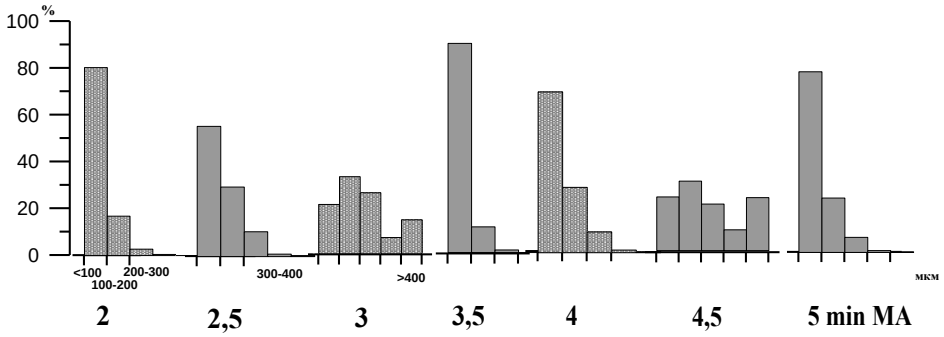

Fig.1 Histogram of the distribution by size of fractions at different MA times .

It shows experimental data from 2 to 5 min. MA. Periodic bursts of the brittle fraction and changes in the values of other fractions are visible. A value of 5 min. MA is not the limit value. The maximum value is 7 min. which was found from data cloud analysis and graphical phase portraits [3, 4]. The histogram is clearly divided into self- similar zones. It was found that the role of resonant effects (bursts) is played by the amount of the most fragile fraction in this self- similar diagram. Such high-profile self- similarity is observed for the other factions.

Comparison with the Bernoulli diagram allowed us to calculate the parameter through which the Euclidean dimension is transformed into a fractal one. Using it, you can calculate the location of the main events located on the x-axis. This is how the updated MA time values were obtained, in which the main events occur, i.e. extreme values are observed. We also obtained refined values of the limits of the system operation, using combinatorics we refined and determined the maximum limit value, it = 6, 75 min. MA. Thus, the identified inheritance of the behavior of each subsystem to the subsequent process steps to obtain the synthesized product, found the time MA receive major system events, found an updated limit values of the system, identified the times of MA optimal for obtaining the target compositions of the particular phase.

Acknowledgements: The blessed memory of Raskolenko Larisa G. whose ideas are the basis of this work.

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This work was carried out within the RFBR grant 14-03-00666A