

## **Peculiarities of the structure and state of the particles of aluminum-carbon composite obtained by the method of MCT**

A. Bakkara, B. Sadykov, N. Mofa, Z. Mansurov

al-Farabi Kazakh National University, al-Farabi ave., 71, Almaty, Republic of Kazakhstan  
The Institute of Combustion Problems, Bogenbai batyr str., 172, Almaty, Republic of  
Kazakhstan

E-mail: bakkara\_ayagoz@mail.ru

**Keywords:** mechanochemical treatment, aluminum, modifier, graphite, stearic acid, polyvinyl alcohol, composite, active centers

The paper presents the results of mechanochemical treatment of particles of aluminum powders in a dynamic action mill using carbon-containing modifiers as a surface-active additive in order to increase the dispersity of the powders and modifying the surface layer of the initial particles. During the mechanochemical treatment of aluminum with organic additives, the oxide surface layer is partially restored, several types of active centers are formed, capable of entering into chemical reactions when using the obtained compositions as part of various combustible mixtures.

Electron-force microscopy, X-ray phase analysis, IR spectroscopy and EDX, particle size analysis analyzed the morphology, dispersion and structure, the average particle size of aluminum powders after mechanochemical treatment with different carbon-containing modifiers (graphite, stearic acid and polyvinyl alcohol), showed significant changes of layer of particles.

The results of the study showed that with an increase in the content of modifiers, i.e. carbon and polyvinyl alcohol in the composite (Al-modifier) aluminum activity increases, except for stearic acid. With an increase in the content of stearic acid in the composite (Al-modifier), the increase in the activity index decreases. This may be due to the fact that in the process of grinding the mixture (Al-modifier) with a large amount of stearic acid (more than 5%) on the surface of aluminum particles, a dense encapsulating layer, poorly soluble with alkali, is formed.

During mechanical action in the powders of the investigated compositions, both accumulation and redistribution of defects in the particle volume, an increase in the amount of active aluminum, there takes place formation of active centers and formation of an encapsulating layer on the aluminum surface based on organic modifiers.