

Short Communication

Properties and Characterizations of Powders Produced from Waste Carbides

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The prospects of using the method for dispersing the EDM carbide nanopowders. It is noted that the evaluation of the effectiveness of their use requires a comprehensive theoretical and experimental studies.

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The first studies on the application of electrical erosion of metal powders to produce belong to the 40th years of the last century. In 1943, BR Lazarenko and NI Lazarenko suggested the use effect for electrical erosion of fine powders [1-12]. Despite the fairly high-performance Kuyu powdering, dispersion of the powder, the possibility of regulation of grain size and the degree of cooling, as well as relatively low-cal energy costs and environmental friendliness of the process, as opposed to of other ways to get the powder from the waste of hard alloys, contribute -own produce metallic powder by electroerosive tion dispersion (EED) is not widely used in the industry. This is due to insufficient knowledge of the structure and properties of powders, as well as the laws of processes for powdering electro-discharge dispersion of waste carbide.

One possible application of the method is EDE re-processing waste trudnopererabatyvaemyh nanopowders in metallic materials, such as tool materials, titanium alloys, etc. In particular, the authors of this method has been used for waste-chennyh special tungsten carbide.

Sintered carbides in modern technology is very important. The basis of most used carbide is tungsten carbide. Analysis of a research work in the field of tungsten carbide shows that most of them are related to the question of economy of tungsten.

EDM process dispersion (Fig. 1) represents the destruction of the conductive material in the result of the local impact of short-term electrical discharges between electrodes which are in the working fluid.

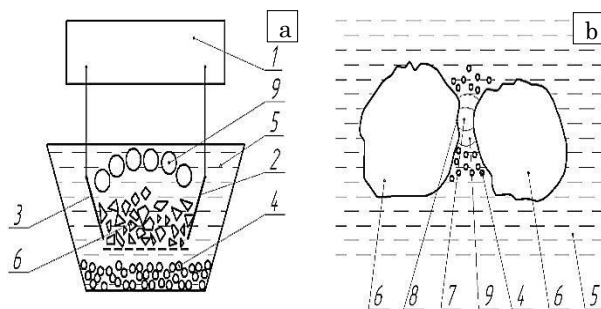


Fig. 1 – EED process: a) the installation diagram, b) diagram of the process

Impulse voltage generator 1 is applied to the electrodes 2 and 3 and on the plates of solid alloy 6. The electrodes are also a carbide plate. With the achievement of the defined voltage value is electric-sky sample fluid 5, located in the area between the electrodes, with

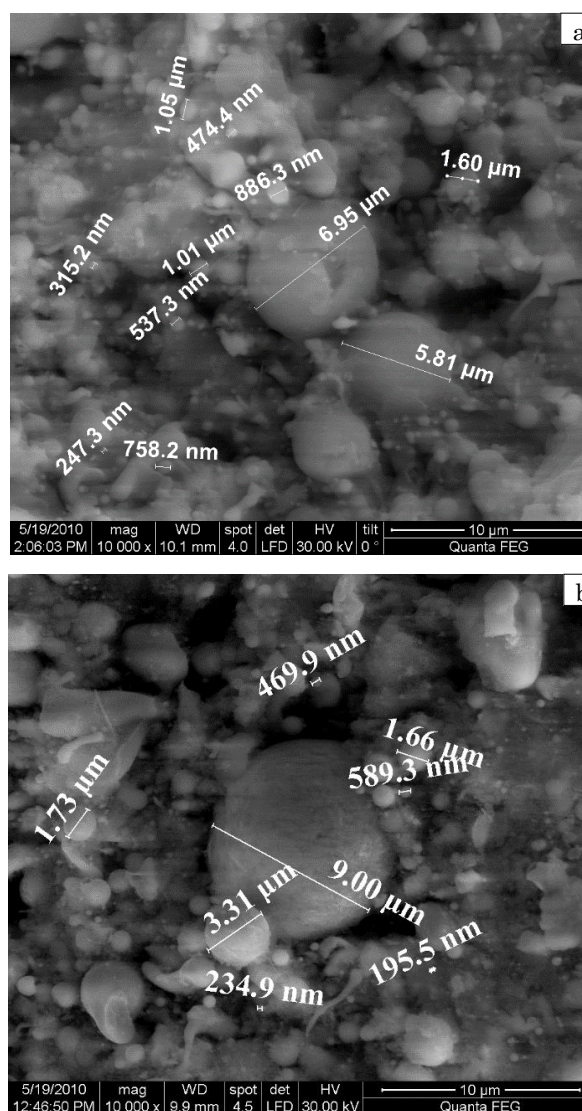


Fig. 2 – The powder obtained EED alloy: a) VK8 b) T15K6

the formation of the discharge channel 7. Due to the high concentration of heat, the material at the point of discharge plans becomes 8 and evaporates the liquid to evaporate and surrounds the discharge channel gaseous decomposition products 9. As a result, developing in the discharge channel and the decomposition products of significant fluid dynamic forces droplets of molten material 4 ejected outside the discharge zone to the working fluid, ambient electrodes and solidify therein, forming a drop-like carbide particles (Fig. 2).

The widespread use of the method for processing EDE ramsoderzhaschih tungsten carbide powders in order to re-use is constrained by the lack of a scientific and technical literature, full of information on the effect of the initial composition, temperature regimes and obtain the properties of the powders, and the practical application of the technology. Therefore, to develop recycling technologies powders produced from waste tungsten carbide, and evaluate the effectiveness of their use requires a comprehensive theoretical and experimental research.

In experimental studies found:

1. Investigated the structure and properties of powders produced from waste carbide VK8, T15K6 into oxygen and carbonaceous-containing fluids. Found that increased viscosity and boiling fluid powder particle size decreases. The quantity of high-temperature phase β -WC powder increases. It is shown that the dispersion

of an oxygen-containing fluid leading to loss of carbon but in the powder until obtaining phase W_2C and W, and dispersing of liquid in the carbonaceous reducing carbon loss and contributes to the formation of phases α -WC, TiC.

2. Found that the powders obtained from waste ramsoderzhaschih tungsten carbide have a particle size of 3 nm to 50 microns. It is noted that in the particle size distribution of the resulting powder EDE, the most significant influence regimes we dispersion (voltage, capacitance and frequency of the pulse) and the properties of the working fluid.

3. Chemical and X-ray microanalysis It was found that the chemical composition of powders depends on the working fluid and is independent of the electrical parameters of the process of EED. It was determined that the obtained powders have distorted ITATION crystal lattice and consist of the following phases:

- For liquid oxygen: VK8 - W, W_2C ; T15K6 - W, W_2C , TiC. It should be noted that in the case of powders, a small amount of the phase α -WC;
- For carbon-containing liquid: VK8 - α -WC, β -WC; T15K6 - α -WC, β -WC, TiC.

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