ETHIOPIAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

eISSN: 2349-5715 pISSN: 2349-5707

Volume: 11, Issue 04, April-2024 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980 2024: 7,662

AREAS OF USE OF COMPOSITE MATERIALS MADE OF METAL OXIDES AND CARBIDES

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Annotation: This article talks about the materials used to apply some of the properties of materials obtained by baking in powder metallurgy. There is information about the stages of creating composites by forming carbides of srconium minerals.

Key words:annealing, oxide, metal powder, oxide film, composite material, carbide, carbide oxide composite.

Enter: Carbides (lat. carbo - coal) are compounds of hydrocarbons, mainly with metals and some non-metals. According to the type of chemical bond, carbides are divided into 3 main groups: there are ionic or covalent and metallic carbides[1].

Ionic carbides contain metal cations and carbon anions. Ionic carbides include acetylenides (products with metal atoms replacing hydrogen in acetylene C_2H_2) and methanides (products with metal atoms replacing hydrogen in methane CH_4). Alkaline metal carbides Li_2C_2, Na_2C_2 alkaline-earth metal carbides CaC_2, VaC_2, MgC_2 higher metal carbides AlC_2, LaC_2 and actinoid carbides TiC_2, WC are acetylenides. Acetylenides, such as calcium carbide, decompose in water or dilute acids to release acetylene or a mixture of acetylene with other hydrocarbons, sometimes hydrogen. Beryllium carbide BeC, aluminum carbide Al_4C, which are easily hydrolyzed and release methane, belong to methanides [2-5].

Examples of covalent carbides are silicon carbide SiC and boron carbide B_4C or rather B_2C_3. In these, the interatomic bond is very strong. Covalently bonded carbides are extremely hard, heat-resistant, chemically inert substances - semiconductors.

Metallic carbides include hard-melting metal carbides. These carbides are called "metallic" because they conduct electricity well. Their hardness is very high, they withstand friction well. Alloys of titanium carbide TiC, zinc carbide ZnC, niobium carbide NbC, hafnium carbide HfC and tantalum carbide TaC are of great importance. For example, an alloy consisting of 25% HfC and 75% TaC has a very high melting point of about 4000°C. Metal carbides are resistant to alkalis but very resistant to acids. The methods of heating metal and coal powder in an inert gas or reducing medium, as well as liquefaction of metal at 1500-2000°C are used more often. Carbide metals are widely used in the production of heaters for electric furnaces, hard metal ceramic alloys, heat and fire-resistant alloys, abrasive materials, transmission pipes, reactor internals as reducers and catalysts, as well as in electronics [3-5].

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Fired ceramic materials. Such ceramic materials are used in the mechanical processing of steel products that have produced viscous waste.

The disadvantage of such composite materials is that the bending strength is not very high, there is a possibility of scattering, and it does not conduct heat well.

Therefore, tools made of such composite materials are used for mechanical processing of very small surfaces, low-speed cutting, and smooth surfaces from smooth machining. In order to eliminate such shortcomings, researches and experiments are carried out, and in order to expand the fields of use of such devices, metal and metal-based hard-to-melt metals are prepared by adding alloys, and the following content is currently being developed.

Al_2O_3+Mo(Ni,Co,Fe,Cr)

Al_2O_3 +Mo_2C(WC, TiC,+WC)

Al_2O_3+TiC+Mo_2C yoki Al_2O_3+Ti+TiC

Methods: In practice, oxide-based mineralo-ceramic cutting materials are widely used in practice. (Al_2O_3 +Mo_2C+TiC) in technology, such composite materials are called "cavenite". Carbide compounds make up 20-40% of solid solution.

Carbide percentage hardness is up to HB=2000, HB=2500-2900 according to Birinnel, bending strength is equal to -500 N/mm2.

The hardness of the hard alloy prepared after heating is HB=1350-1750, the bending strength limit is equal to 2 N/mm^2.

The cutting speed of carbide oxide cutting tools is 2 times harder than that of hard alloys and 12-20 times faster than the cutting speed of cutting steels [4].

Zr and Hf are 0.0173 and 0.00045% in the Earth's crust, respectively. Both elements are characterized by a very high degree of dispersion in rocks. Zr is the most common of the rare elements. Hf is a low-carbon element and its geochemical fate depends on Zr. The behavior of zirconium in geochemical processes is determined by the following: 1. Zr is a good complex former, in most cases it provides high mobility and mobility. 2. In the physical-chemical system ZrO_2-SiO_2, at any values of the ratio of these oxides, a stable intermediate phase of $ZrSiO_4$ is formed and determines the good development of 33-accessory zircon in various rocks. In nature, mainly zircon ($ZrSiO_4$) (67.1 % ZrO_2), baddeleyite (ZrO_2) and various complex minerals (eudialite $(Na, Ca)_5$(Zr, Fe, Mn) [O,OH,Cl] [Si_6O_{17}] and other types are distributed. Zirconium is a companion element to zirconium because it is an isomorphic replacement of the zirconium atom. Zirconium is the most common mineral in all types of rocks, but mainly in granites and syenites [5].

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Figure 1. Zirconium minerals in rocks

Discussions and results: Due to the high mortality of such (carbide oxide) cutting tools, the structure on the metal surface is formed in a very small layer, continuously, without friction. Therefore, with the help of such tools, they are used for clean processing of metal surfaces and for "milling" of very thin layers of steel products. Oxide carbide tools can be used for mechanical processing of non-ferrous metals, cast iron, polymer and graphite materials. Hard-to-melt metal oxides are composite materials in the field of metallurgy. will be covered with fabric.

Such a material must be resistant to decay under the influence of liquid metal, and in order to ensure that it is very resistant to the influence of molten metal in the bath for several hours, "ketmet" composite materials are developed [8].

ZrO_2+Mo, Al_2O_3+(TiO_2)+Cr (MoW)

ZrO2+Mo= Mo= 13-25% in the composite alloy.

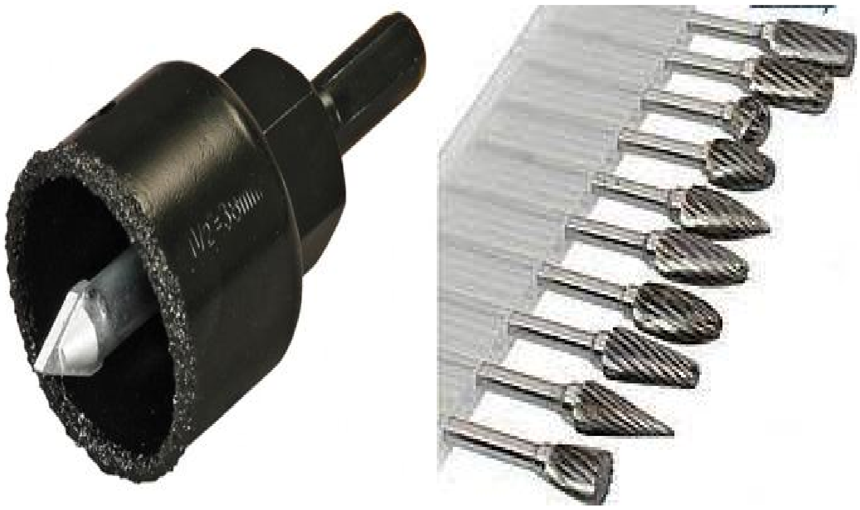

Figure 2. Tools made of carbide oxide composite materials.

Summary. Such a protective coating is used in the production of metal processing products in the presence of oxygen in "converters" with the presence of composite materials. Composite materials prepared by heating ZrO_2+Ti can be used as a protective metal in metal melting furnaces in the future.

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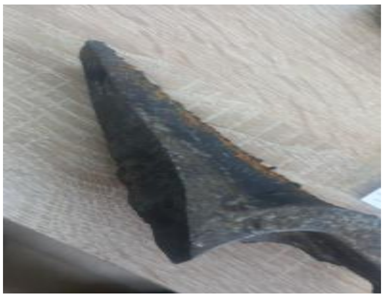

Figure 3. Carbide oxide composite material obtained in laboratory conditions.

In practice, samples of such composites were taken and their mechanical properties were studied. The analysis of the samples was studied in metallographic microscopes for the carbide oxides of metals. Their technological and mechanical parameters achieved positive results.

REFERENCES:

1. R.A.Anririlvokiy "Poroshoknaya metallurgiya" Moskva 1983.
2. F.R Norxo'jayev "Materiallshunoslik" Fan va tarraqiyot nashryoti 2014.
3. E.O. Umarov "Materiallshunoslik" 2014.
4. G.A. Pibelnsoyn "Osnoviy parashoknaya metallurgiya" Moskva 1987.
5. Tagayev I.A., Doniyorov N.A., Sharipov S.Sh." Noyob va radioaktiv metallarning kimyoviy texnologiyasi" darslik Navoiy-2021.
6. Otaqo'ziyev, A., & Axunjonov, A. (2023, September). ENRICHMENT OF THE CHEMICAL COMPOSITION OF CEMENT USING FOUNDRY WASTE. In " ONLINE-CONFERENCES" PLATFORM (pp. 379-380).
7. Adaxamjonovich, O. Z. A., & Jaksilikovna, O. G. (2024). THE IMPORTANCE OF CALCIUM OXIDE IN THE PRODUCTION OF PORTLAND CEMENT CLINKER AND THE STEPS OF THE PRODUCTION PROCESSES. Ethiopian International Journal of Multidisciplinary Research, 11(03), 292-295.
8. Otaqo'ziyev, A. A., & Axunjonov, A. S. (2023). GIL TUPROQNING BAZI XOSSALARIDAN KELIB CHIQIB QUYMAKORLIKDA ISHLATILISH SOXALARINI TANLASH.: GIL TUPROQNING BAZI XOSSALARIDAN KELIB CHIQIB QUYMAKORLIKDA ISHLATILISH SOXALARINI TANLASH.
9. Makhammadjanov, K. A. O., Otaqoziyev, A. A., & Mutalipov, X. O. O. (2021). Research protective metal coatings to face the elements. Asian Journal of Multidimensional Research, 10(10), 1213-1217.
10. Koraboyevna, A. S. (2024). STUDY OF SURFACE FINISHING USING A MACRO-SAMPLE. Ethiopian International Journal of Multidisciplinary Research, 11(04), 301-306.

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11. Adaxamjonovich, O. Z. A. (2024). ANALYSIS OF THE MAIN TECHNOLOGICAL STAGES IN THE PREPARATION OF CEMENT. Ethiopian International Journal of Multidisciplinary Research, 11(04), 320-324.

12. Tursunovich, T. A., & Muxtorjon o‘g‘li, T. M. (2024). STRENGTHENING OF A METAL SURFACE WITH AN ELECTRIC ARC. Ethiopian International Journal of Multidisciplinary Research, 11(04), 325-330.

13. Rasaki, S. A., Zhang, B., Anbalgam, K., Thomas, T., & Yang, M. (2018). Synthesis and application of nano-structured metal nitrides and carbides: A review. Progress in Solid State Chemistry, 50, 1-15.

14. Shaikh, N. S., Ubale, S. B., Mane, V. J., Shaikh, J. S., Lokhande, V. C., Praserthdam, S., ... & Kanjanaboos, P. (2022). Novel electrodes for supercapacitor: Conducting polymers, metal oxides, chalcogenides, carbides, nitrides, MXenes, and their composites with graphene. Journal of Alloys and Compounds, 893, 161998.