STRUCTURAL FEATURES BAKED COMPOSITE CONTACT MATERIALS IN ELECTRIC CURRENT SWITCHING

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Disclaimer electrical equipment in electrical agriculture leads to great loss of production, reducing its quality. Therefore, improving the reliability of electric vehicles is one of the complex and multifaceted technical problems. It is connected with the creation and implementation of new contact materials that can ensure asked reliability, lower material costs for production and repair and saving precious metals. Analysis of the results of erosion tests, structural and morphological studies contact surfaces provide an opportunity to identify important mass transfer value as evaluation criteria electrocontact material. Working contacts in the inversion zone can significantly reduce the loss of precious metals in the process of erosion, which is important in the economic aspect.

The purpose of research - to study the mechanism of mass-transfer patterns of erosion and destruction of contact pairs made from materials based on silver with the introduction of their staff additions oxides and refractory metal.

Materials and methods of research. Microscopy techniques can significantly extend the idea of the mechanism and kinetics of several processes of powder metallurgy and promote disclosure mechanism structure, which significantly influences the electric properties of materials.

Microstructural analysis of materials based on Ag oxide supplements reveals an overall picture of distribution of reinforcing additives in the matrix. The relatively evenly, as a point particle inclusions distributed oxides are introduced into the matrix silver internal oxidation. Microstructures of samples, with the introduction of various oxides like, matrix visible light tone, grainy structure, grain shaded the second phase, which lies between the coasts.

As the number of oxides in the matrix there are some savings oxides, the size gap between the grains grow, and Ag particles find themselves almost completely surrounded by them.

Structure fracture surfaces of composite materials is closely related to the nature of the components of composite materials.

Besides the destruction composite behavior depends on the particle size of the volume number and strength of the interface.

Results. The final structure slabostrumovyh electrical contacts formed by dispersing structural components and the emergence anizotropnosti material as a result of directed deformation with simultaneous formation of substructure. Anisotropic structure formation in multicomponent heterophase compositions directed distribution in the structure of the thermal conductivity and electrical components leads to their high values in general and provides high electrical resistance.

Introduction to silver oxide matrix In and 5% Mn prevents cold deformation.

Appears texture as a result of rolling, and the anisotropic structure formed electrocontact material.

Composite materials reinforced oxides, refractory material, need 5-10 stages of rolling with intermediate annealing at 600 ° C in air for hours.

The processes of plastic deformation electrocontact finally form the structure of the material. Introduction insoluble phases promote intensive grinding grain silver matrix.

The particles of insoluble components also crushed (dispersed) and vystroyuyutsya the chain along the Ag grains deformed and partially within them, while maintaining orientation towards deformation. Chains oxide matrix extracted under deforming effort in changing the shape of the grain, their location remains after annealing 600 ° C.

Introduction to Ag Zr vyzyvaye ductile fracture mechanism.

Structural and morphological research work surfaces during switching current up to 10A make it possible to follow the stages of structural changes in the operation and their impact on the reliability of electric steam.

The aim is to study morphological mechanism of mass - transfer patterns of erosion and destruction of contact pairs made from materials based on silver (Ag) with the introduction of their staff additions oxides and refractory metal.

In the first phase investigation work surfaces contacts made from materials Ag - Zr - Y2O3.

When the load 2 and the cathode formed from melted crater edges, surface covered with small drops given according to microanalysis silver with traces of pure refractory metal zirconium. The anode is evenly coated particles transferred from the cathode silver.

Increased capacity curves 5 and changes to the working surface topography contacts. Despite the change of current load, the wear becomes more uniform and the surface more uniform.

In some areas intensively evaporate Ag cathode, the individual grains of refractory metal - zirconium exposed.

This is due to the fact that the arc channel on composite materials attached to the cathode and anode at grain boundaries, blocks and oxide particles, which have a lower heat dissipation compared to the Ag matrix.

Availability oxide matrix facilitates the emergence of issue centers on the border of the metal-insulator centers and vaporization.

Weight anode while decreasing slightly, although its surface is enriched in Ag, which is deposited in it suffering from the cathode, forms a flat surface on which there melted areas.

When switching current 6 creates a dynamic equilibrium exchange material between electrodes.

In terms of a more powerful arc (7 A) effects occur deep under the action of fast electrons that create pockets of local overheating.

The basic amount of energy transmitted anode allocated not on the surface, but at a certain depth and intense heating of the metal.

Silver vapor escapes to the surface of the anode, forming deep craters.

The integral spectrum has lines of all three elements of composite material: Ag-Zr-Y2O3. Cathode surface is smoothed and in turn covered in some places remote from centers of overheating particles of silver transferred from the surface of the anode. Current load 10A enhances processes as bulk and surface overheating.

On the working surface of the cathode raises several specific areas related to the presence of horizontal temperature gradient along the work surface.

In the center, where most of the curve is fixed, there is intense evaporation, melting, spraying both Ag contacts.

At the periphery, a cold compared with the central part, the money is deposited in the form of flakes partially melted, and the cathode deposition prevails, and as a result, increasing its mass.

Due to increasing thermal and mechanical stresses on the surface of the electrodes in this mode may appear shallow cracks.

As the cathode and the anode according to microanalysis lines are all elements of composite material: Ag, Zr, Y2O3.

On the surface of the cathode can distinguish three concentrically arranged zone.

The first is pa edge electrode and is osivshi conglomerates Ag in the form of flakes. The second area - a continuous layer of silver. The central part - the most protruding enriched zirconium and Y2O3

The structure build-up and cross-sectional data microanalysis allowed to determine the nature of mass transfer components of the composite material on the surface of the cathode. In the early period of switching to the surface of the cathode is transferred silver, accompanied by enrichment entered anode surface additives.

After this enrichment anode surface additives are intensively transferred to the cathode, where they are parallel to the work surface contact in a serious matter.

Microanalysis showed that they consist of metallic additives. At what point is the anode surface is enriched in silver and the arc is transferred mainly a fusible component.

Current load 10 causes energy intensive removal as matrix material and the money put into supplements.

In the process of mass transfer are beginning to consistently participate material components in descending order of their thermal conductivity and refractoriness growth in line with rising energy characteristics of the process.

There is a gradual transfer of components: first vaporized silver, then introduced components, then the whole cycle repeats again.

It is advisable to the operation of each specific material to use it for switching currents currents meet its inversion zone, which defines a smaller loss of material contact pair.

For material Ag - Zr -Y2O3 current range of 5.7 A, and for material Ag - Y2O3 - C - range of Dolov ampere currents up to 2 A.

Analysis of erosion testing and structural morphological research work surfaces enable contacts reveal important value inversion mass transfer zone as evaluation criteria electrocontact material near the main electric characteristics as its zone of optimal current loads.

Characteristics of each contact material to determine its operability in a particular machine must have not only the basic electric properties, but the point of inversion mass transport of the material in the range of current loads in a given mode of loading.

Working contacts in the inversion zone can significantly reduce discards of precious metals in the process of erosion, which is important in the economic aspect. Using criteria inversion zones reduce to a minimum the probability of error when choosing material for a full electrocontact conditions.

Conclutions

The structural scheme of kinematics formation of physical and mechanical properties of surfaces contact details of electrical apparatus. The character of mass transfer components of the composite material on the surface of the cathode. Determined important areas inversion mass transfer as evaluation criteria electrocontact material and its optimal zone current loads.