

ON THE MECHANISMS OF SINTERING THERMOMECHANICAL TITANIUM POWDER

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Annotation.

The aim of the work is to investigate the mechanisms by which the sintering of titanium alloy powders of nonspherical shape, depending on their pressing modes, leads to atomic diffusion during isothermal holding of samples.

The production of various products using powder metallurgy technologies is currently an urgent task in the development of the domestic industry. The simplest technological sequence of this technology is presented in the form of pressing with subsequent sintering of the formed powders. To describe the process of sintering powders to produce porous bodies, it is very important to study the possible mechanisms and kinetics of mutual sintering of powder particles that are in initial contact at a point.

If the contact is formed at an early stage of the process, when the contact stresses are sufficiently high, mass transfer in the plastic flow mode can occur. This is especially true at "low" temperatures, when the processes that are activated by increasing temperature are slowed down or practically absent. Further contact formation is already a consequence of diffusion. The rate of diffusion increases with increasing temperature of the thermal process.

The above mechanisms and sequences for obtaining semi-finished products using powder metallurgy technology were obtained for a number of materials that, although they have physical properties similar to titanium alloys, are not titanium. Therefore, it will be important to clarify the mechanisms of sintering for titanium alloys. This study can be divided into two parts depending on the process temperature: a low-temperature part and a high-temperature part.

The processes have been modelled for spherical powder particles in known studies. Therefore, the mechanisms of sintering of particles of arbitrary, non-spherical shape are of interest.

Thus, the aim of this work is to investigate the mechanisms by which sintering of titanium alloy powders of nonspherical shape occurs, depending on the modes of their pressing before atomic diffusion during isothermal holding of samples.

It is necessary to study the process of contact formation when the contacting surfaces are macroscopically rough and the process of particle fusion, which occurs in the area of high temperatures and in the presence of different compressive forces.

Literature:

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