

Technology market “RESEARCH TO BUSINESS”

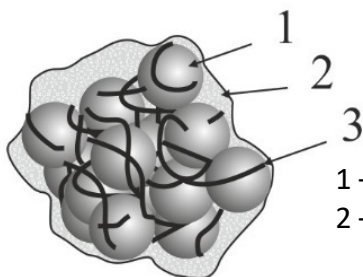
Offer № 012PA

Solder paste

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The invention relates to a solder paste used for soldering surface mount elements on printed circuit boards or other metal elements. The paste contains metal solder suspended in flux and metal wires, the size and amount of which determine its properties, for which a patent has been issued in Bulgaria.

Application № 113111



- 1 – powder metal solder;
- 2 – flux with additives for viscosity control, thixotropy, adhesiveness, etc.;
- 3 – metal wires.

Diffusion brazing solders contain alloy particles with a low melting point and powder with high melting point embedded in them. A composition of tin-based diffuse soldering paste with added powdered copper is known. After heating the mixture to a temperature lower than the melting temperature of the high-melting component and higher than the temperature of the low-melting component, a solder is obtained that cannot be melted at the initial melting temperature. A disadvantage of the known diffusion solder pastes is the powder form of the added copper, which leads to a higher ratio of free surface to volume of the metal component, which changes the rheology and thixotropy of the paste.

Technical solution

The task of the invention is to create a paste for diffuse soldering, which is a mixture of solder grains of one or more metals and a gel-like component containing flux and additives to achieve a certain viscosity, thixotropy, stickiness, etc., in which a metal component with higher melting point has been added in the form of wires. The solder grains are typically spherical in shape and have dimensions less than 70 μm , and the melting temperature of the solder is typically below 250 $^{\circ}\text{C}$. The dimensions of the new additive (the metal wires) allow diffuse dissolution in the solder and the resulting solder has a melting temperature higher than that of the solder grains.

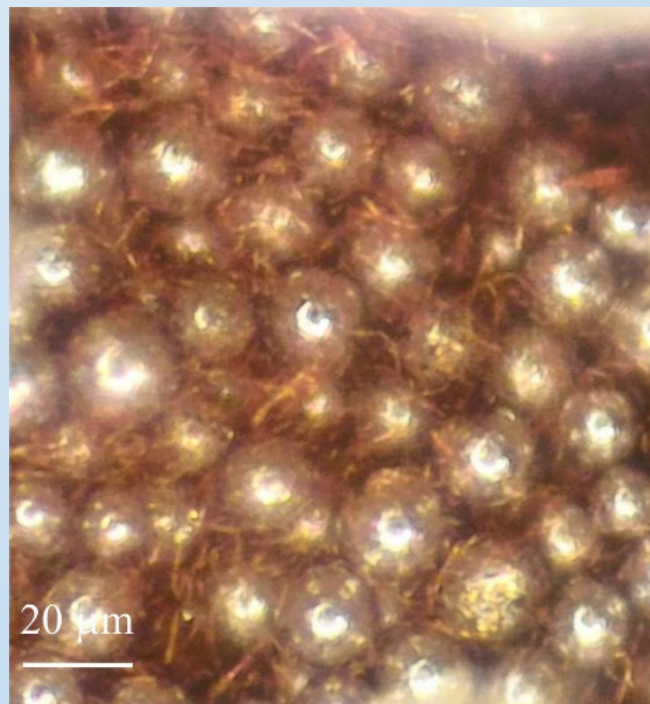
The wires have a diameter at least 10 times smaller than the diameter of the solder grains, and their length can be smaller, commensurate, or greater than the diameter of the grains according to the desired thixotropy of the paste. The diameter, length and quantity of the wires are selected depending on the required thixotropy of the paste and the parameters of the diffuse solder (time, soldering temperature, temperature resistance, etc.).

Application and advantages

An exemple implementation of diffusion solder paste is shown in the optical microscope image below. The solder paste is a surface mount paste PF 602-P30 with solder based on tin and bismuth. The flux is halogen-free and 0.25 to 1% (mass ratio) copper wires are added. The copper wires were obtained by electrochemical filling with copper of pores in a 60 μm thick anodic aluminum oxide nanomatrix and its subsequent dissolution. The mixture of copper wires and solder PF 602-P30 was stirred for 10 minutes. For the above example, wire variants with a diameter of over 100 nm and a length of 10 to 50 μm were used. The variant is an exemple and does not limit the use of other combinations of solders and metal wires allowing diffuse soldering. The above example does not limit the possibility of using other types of standard pastes for surface mounting or specially prepared depending on the resistance of the wires to the influence of the flux, the required thixotropy, soldering time and temperature resistance after soldering.

The addition of wires to the paste allows to reduce the free surface area of the wires relative to the same mass amount of powder, which reduces oxidation and at the same time an imprint with paste containing wires creates a more stable stamp than one with a powder additive.

Technological images



Contact for this offer



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