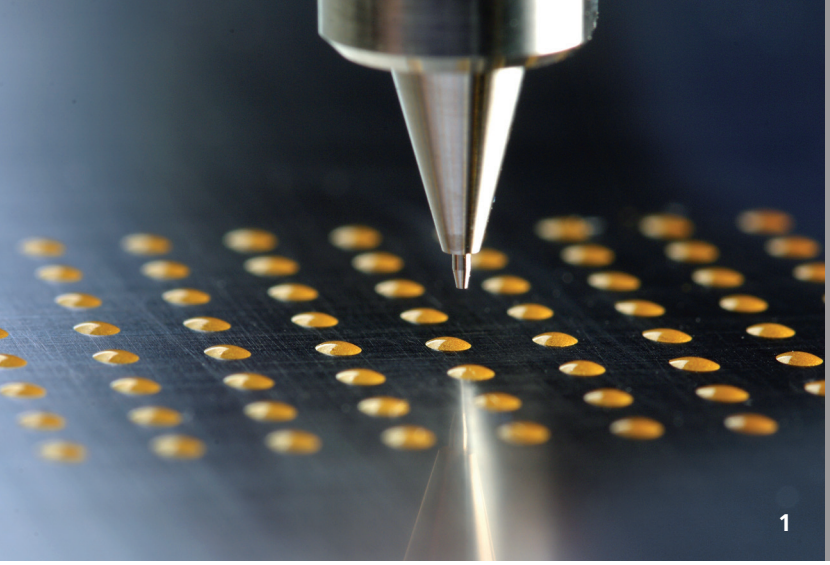

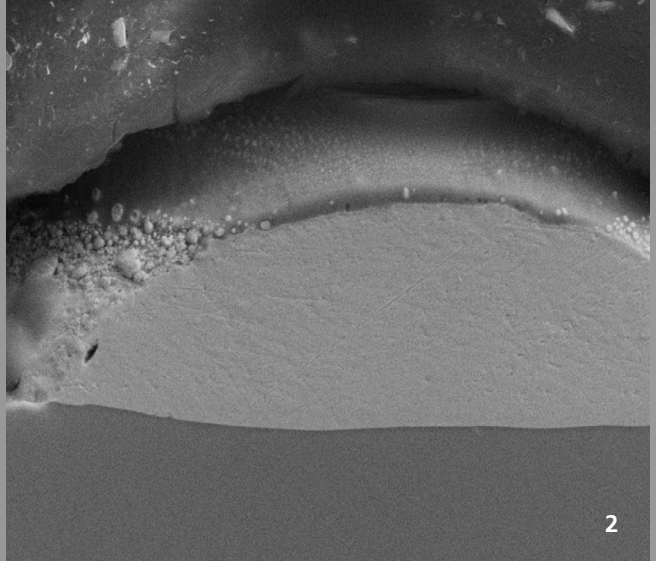

MICRO-LASER METAL DEPOSITION WITH GOLD PASTE

Task

In the electronics industry, the increasing integration of functions and the resulting variety of assemblies are driving factors that advance the development of location-selective and flexible coating processes. Conductive contact layers of, e.g. gold and silver, are predominantly applied using two-dimensional area coating methods such as electroplating. Thanks to powder-based micro Laser Metal Deposition (LMD) of individual precious-metal contact points, the same functionality be can achieved but with significantly less material consumption. A variant of this process is the printing of a paste with a high content of precious metals, > 70 percent, followed by functionalization with laser radiation.

Method

By means of a dispenser, the paste is applied to the substrate in a contact-free manner. The mean diameter of the dispensed spots is about 700 µm at a thickness of about 40 µm. It is essential for the subsequent laser processing that paste dry completely in order to prevent the solvents from evaporating abruptly when they are remelted. Subsequently, the laser beam melts both the metal particles and a surface layer of the substrate material creating a metallurgical bonding.

Result

Both the drying and the functionalization can be carried out with the same beam source. The best results of both steps were achieved with pulsed laser radiation. Within 50 ms, the gold paste was completely melted and metallurgically bonded to the substrate. The welded gold contact points have a homogeneous structure without pores. The dilution with the base substrate is low (Au: 95 - 97 wt.%), so that the contact properties of gold largely remain intact. By combining printing techniques and laser treatment, Fraunhofer ILT can, thus, create resource-efficient contacts at selected locations.

Applications

Micro-LMD with gold pastes can be used wherever the excellent electrical properties of precious metals are needed selectively, but where conventional large-scale coating is not economical. Application fields are found in electronics, fuel cell production but also in heat conductors.

Contacts

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1 Contact-free dispensing of gold paste.

2 SEM image: cross section of gold contact point.

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