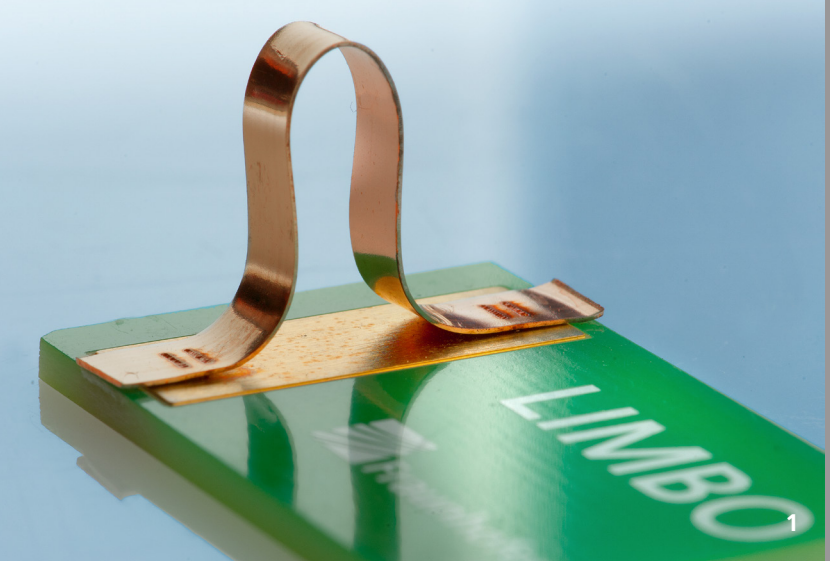
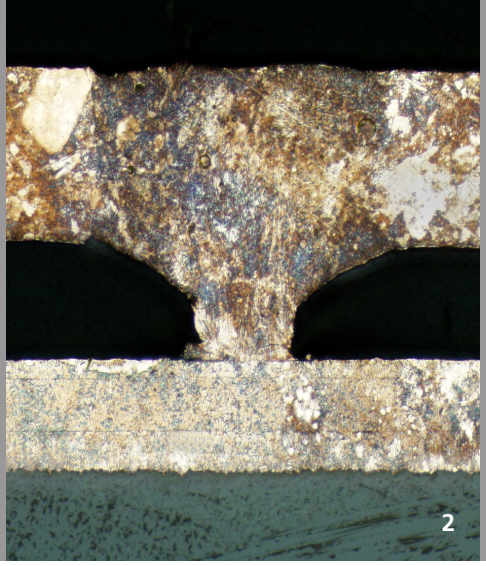


1



2

LASER IMPULSE METAL BONDING (LIMBO) WITH BEAM SOURCES IN THE 515 NM WAVELENGTH RANGE

Task

As demands in high-performance electronics and electro-mobility constantly grow, power electronic components are increasingly required with high robustness and thermal stability. »Laser Impulse Metal Bonding (LIMBO)« enables a cohesive and, therefore, high-temperature-stable joint between thick copper connectors over 200 µm and thin copper metallizations below 100 µm on sensitive substrates. The melting process of the copper material, however, presents a challenge since this material absorbs laser radiation in the IR range to a low degree.

Method

Compared to laser beam sources in the IR range, a laser beam source in the green range (λ = 515 nm) can be used to facilitate the absorption behavior of the copper material in the welding process. The increased absorption of the laser radiation results in targeted control over the energy input and, thus, makes it possible to increase reproducibility and robustness during the melting of the copper connector. With the LIMBO process, an energetic separation between the melting and the connection has been developed, whereby the thermal influence on sensitive substrates is clearly minimized.

Results

The process enables 200 µm copper sheets to be welded on copper-metallized PCB substrates with a reproducible bond. Compared to that of IR laser sources, the process time with beam sources in the wavelength range 515 nm is reduced by a factor of three due to the increased absorption and the targeted energy input in the LIMBO process.

Applications

In semiconductor technology (silicon-based components) or in electrical engineering (FR4), the LIMBO process allows thick connectors to be joined to sensitive substrates with thin metallizations. In addition, the method is applicable for cohesive joining of metallic components with high gap tolerances.

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1 Copper connector contacted on metallization.

2 Cross-section of a weld of copper on a PCB metallization.

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