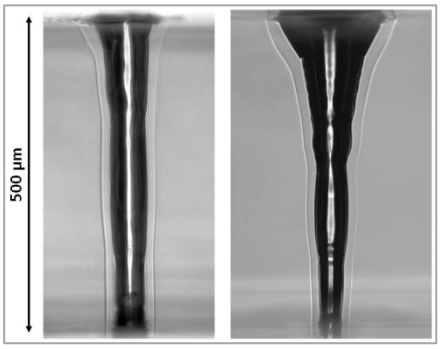
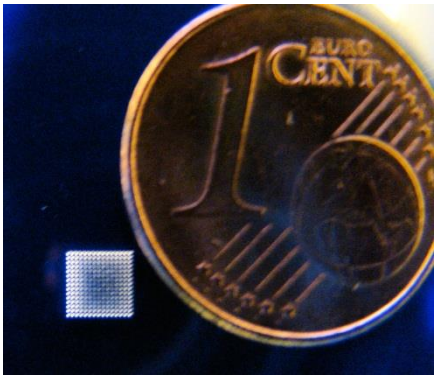
Fraunhofer
IZM

FRAUNHOFER INSTITUTE FOR RELIABILITY AND MICROINTEGRATION IZM



Cross sections of CO_2-laser drilled holes: left: low conicity (d_{in}=71 µm, d_{out}=46 µm); right: higher conicity (d_{in}=122 µm, d_{out}=35 µm)



Array of 225 laser-drilled holes (3 x 3 mm²)

Fraunhofer Institute for Reliability and Microintegration IZM
Gustav-Meyer-Allee 25
13355 Berlin
Germany

Contact
Dr. Henning Schröder
Phone +49 30 464 03-277
henning.schroeder@izm.fraunhofer.de

www.izm.fraunhofer.de

CO_2-Laser-Drilling of Through-Glass Vias (TGVs)

For optoelectronic packaging applications through-glass vias (TGVs) are an important technology for thermal and electrical connections.

Limitations of conventional mechanical or laser-based via processing techniques are resulting in hole diameters that are larger than 100 µm and/or too time-consuming to structure.

At Fraunhofer IZM CO_2-laser-based drilling of glass has been enhanced to realizing nearly cylindrical holes with low conicity, with diameters smaller than 100 µm. Furthermore, processing times per hole amount to less than 0.25 seconds in glass with 500 µm thickness.

The fast drilling speed, unrivalled compared to other lasers, and much lower equipment costs make the CO_2-laser very suitable for economic industrial micromachining of glass substrates. In addition, generated glass surfaces are very smooth, and diameters as well as conicities of the holes can be adjusted by parameter variation.

Due to the thermal ablation process the development of thermally induced stresses cannot be avoided, but depending on the layout, in particular the pitch, the resulting stresses are non-critical. If required, different thermal pre- and post-treatments for reducing mechanical stress and increasing reliability can be applied.