



- 1 Laser beam soldered prism assembly (SQ1).
- 2 Reflow soldered EUV-mirror with mounting (Invar®/JULE).
- 3 Laser beam soldered mirror assembly (Zerodur®).

SOLDERING – A PACKAGING TECHNOLOGY FOR STABLE OPTICAL SYSTEMS

Fraunhofer Institute for Applied Optics and Precision Engineering IOF

Albert-Einstein-Straße 7
07745 Jena

Director

Prof. Dr. Andreas Tünnermann
Phone +49 3641 807-0
andreas.tuennermann@iof.fraunhofer.de

Contact

Dr. Ramona Eberhardt
Phone +49 3641 807-312
ramona.eberhardt@iof.fraunhofer.de

www.iof.fraunhofer.de

Motivation

So far adhesive bonding has primarily been used to assemble and adjust hybrid optical systems. Applications are limited due to the properties of the used organic polymers. To meet higher requirements in terms of humidity resistance, UV-stability, thermal cycling and life time reliability the development of new joining technologies for optical systems is necessary. Reflow soldering or laser beam soldering are innovative alternatives.

Applications

- Fixation of optical components on substrates and mountings
- Integration of optical subsystems
- Assembly of vacuum suitable optical systems

Advantages

Laser beam soldering of optical components allows for temporary and regionally-defined energy input and temperature controlled direct and indirect heating of joining areas.

Joining by reflow soldering allows for processing in vacuum or application of reducing gas.

The parts to be joined can be metallized with solder and solder-aiding layers by DC-magnetron sputtering. The coating technology of all layers takes place in one vacuum process and yields high adhesive strength of the thick layers too. Flux free solders, preferable the eutectic Au80Sn20-solder, are used. This high melting solder offers superior strength, high reliability and low creep affinity. External solder, like solder preforms, can be applied externally on selected metallizations.