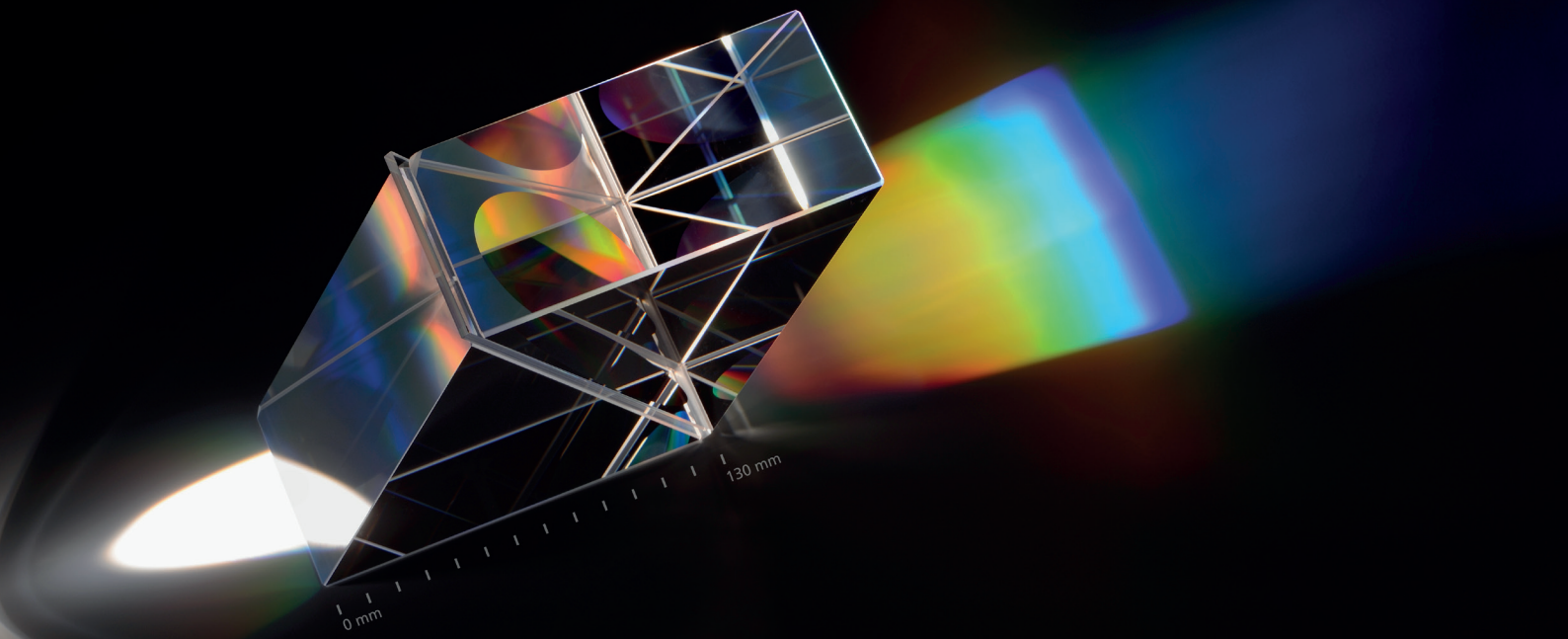
Fraunhofer
IOF

Fraunhofer Institute for Applied
Optics and Precision Engineering IOF



Optical bonding technologies

Interlayer-free bonding technologies of glass and crystalline optical components

Fraunhofer IOF

Optical bonding technologies

Interlayer-free bonding technologies of glass and crystalline optical components

Cover: Interlayer-free bonded prism-grating-prism.

Top: Beam splitter cube with dielectric coating.

Goal

We develop bonding technologies for optical components with regard to a variety of external requirements (e.g. high power laser loads, applications in harsh environments, lithography). Adapted to the application and materials, plasma-activated or silicate bonding is used to fabricate high-precision components with high mechanical stability (up to 80 % of the bulk materials strength) and high transparency. Surface figure and roughness correction is possible to meet the appropriate requirements.

Plasma-activated direct bonding

- Process
  - Extensive materials adapted cleaning
  - Plasma activation
  - High precision alignment
  - Annealing at moderate temperatures (~ 250 °C)
- Requirements
  - Chemical stability against cleaning agents
  - λ/10 surface flatness (stiff geometry)
  - Surface roughness ≤ 0.5 nm rms (10 x 10 µm² measurement area in atomic force microscopy)

Silicate bonding

- Process
  - Extensive materials adapted cleaning
  - Application of bonding solution
  - High precision alignment
  - Annealing at moderate temperatures (~ 250 °C)
- Process requirements
  - Chemical stability against cleaning and bonding agents
  - 3 µm PV surface flatness
  - Surface roughness ≤ 3 nm rms

Silicate bonded achromatic lense doublet.

Contact

Department
Precision Optical Components and Systems

Head of Department
Dr. Stefan Risse
Phone +49 3641 807-313
stefan.risse@iof.fraunhofer.de

Scientific Group
Bonding technologies
Dr. Carolin Rothhardt
Phone +49 3641 807-304
Carolin.rothhardt@iof.fraunhofer.de

Fraunhofer IOF
Albert-Einstein-Strasse 7
07745 Jena
Germany
www.iof.fraunhofer.de

www.
more info