

Ready for **New Space**

SCHOTT's Glass Solution Portfolio for
New Space Applications

With a worldwide presence in 34 countries, the Astro & Space market is one of SCHOTT's core markets

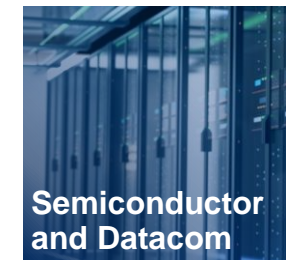
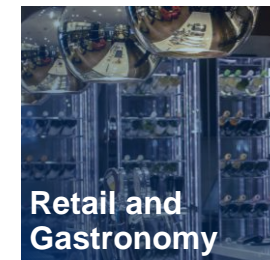
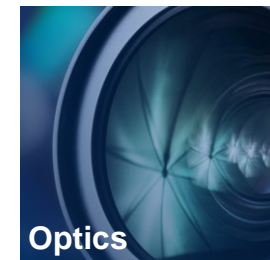
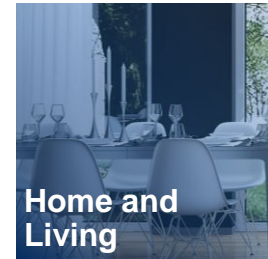
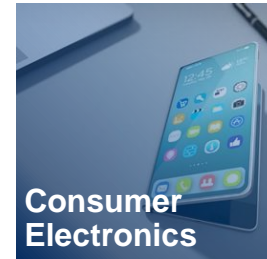
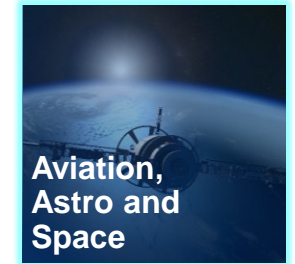
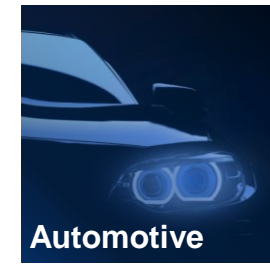
Worldwide presence in 34 countries

43 production sites / 26 sales offices



Broad product portfolio for various markets

Astro and Space is a SCHOTT core market



Our goal is sustainable growth

FY 2020/21

2.52 billion EUR

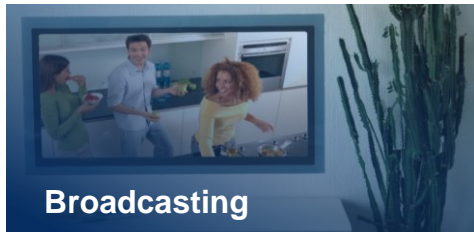
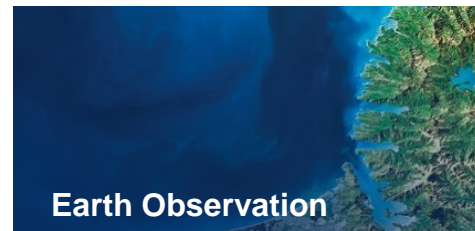
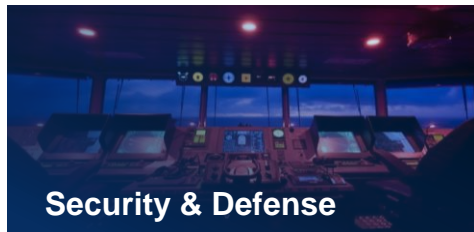
Global sales

17,300

Employees

SCHOTT supports its B2B customers across space end-markets, especially in New Space megatrends

We enable solutions across all major space end-markets



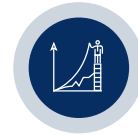
New Space megatrends where SCHOTT products and solutions make a difference



Affordable **Internet from space** and increased connectivity/coverage



Green economies and **sustainable** development



Increasing level of **private invest** and entrepreneurship



Continued **importance of technical expertise** and **innovation**



Enabling "future scenarios" and "space ventures"



More **political conflicts** in multipolar world

1) Including Internet from Space

Space-related material requirements fulfilled

Enabling a wide range of innovative New Space applications



Lightweight



High transmission for optical components



Long component lifetime



Thermo-mechanical stability



Low CTE especially for optical applications



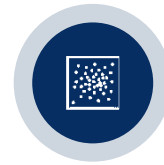
Stability against space radiation ¹⁾



Breakage resistance/
high strength



High precision



Hermeticity for packaging solutions

Specialty glass and glass-ceramic materials, as well as hermetic glass sealed components, enable various applications in New Space by fulfilling space-related requirements

¹⁾ E.g., solarization and particle radiation

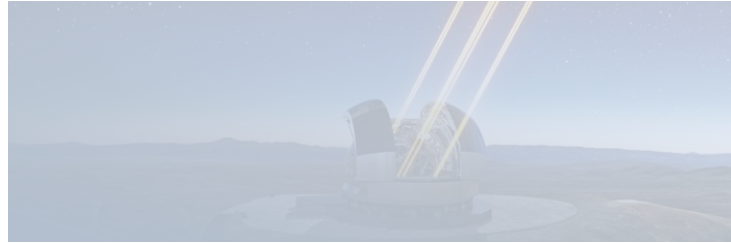
SCHOTT's product offering for New Space

Contributes to diverse product solutions in various applications



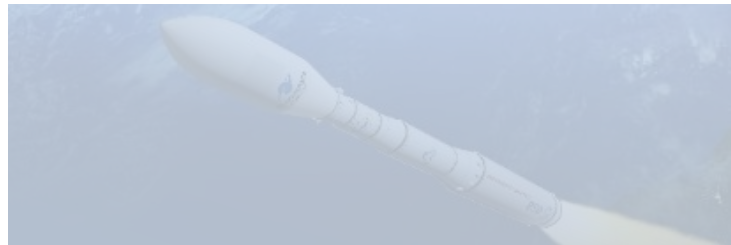
Satellites (incl. Telescopes)

- **ZERODUR® mirror substrates** for telescopes, imaging and laser communication
- **Glass substrates** as thin protective cover for space photovoltaic applications
- **Glass substrates** for RF communication
- **FLEXINITY® connect** for advanced semiconductor packaging solutions
- **Fiber optic light guides** for satellite device alignment and calibration tasks
- **Radiation-hardened fiber optics** for image identification and detection
- **Hermetic micro-electronic packages** for reliable data communication
- **Glass cylinders** for hermetic sensor packages
- Radiation-resistant **optical glasses** for various applications
- Coated **aspherical lenses** for various applications
- **Optical filters and coatings** for earth observation



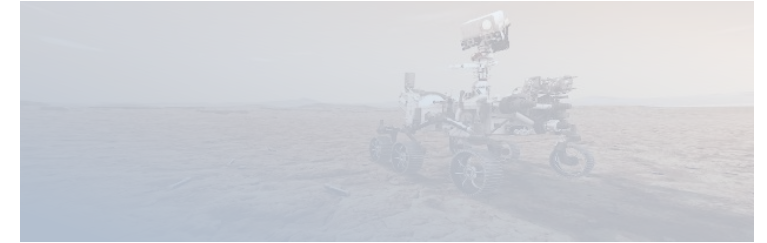
(Ground) Stations

- **ZERODUR® mirror substrates** for laser communication
- **Glass substrates** for RF communication
- **Glass cylinders** for high frequency antennas (e.g., 5G)



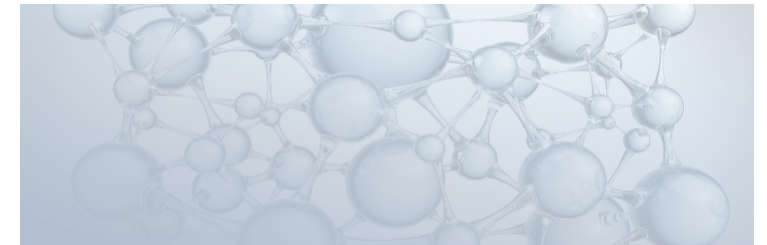
(Re-usable) Rockets

- **Flexible and rigid fiber optic bundles** for tank and propulsion monitoring
- **Porous glass** as thermal protective system/heat shield for spaceships



Other Ventures

- **Glass powder** for creating oxygen via a SOEC for mars rover
- **Glass substrates** as protective glazing in space
- Laser-bonded **hermetic packages** for opto-electronic parts



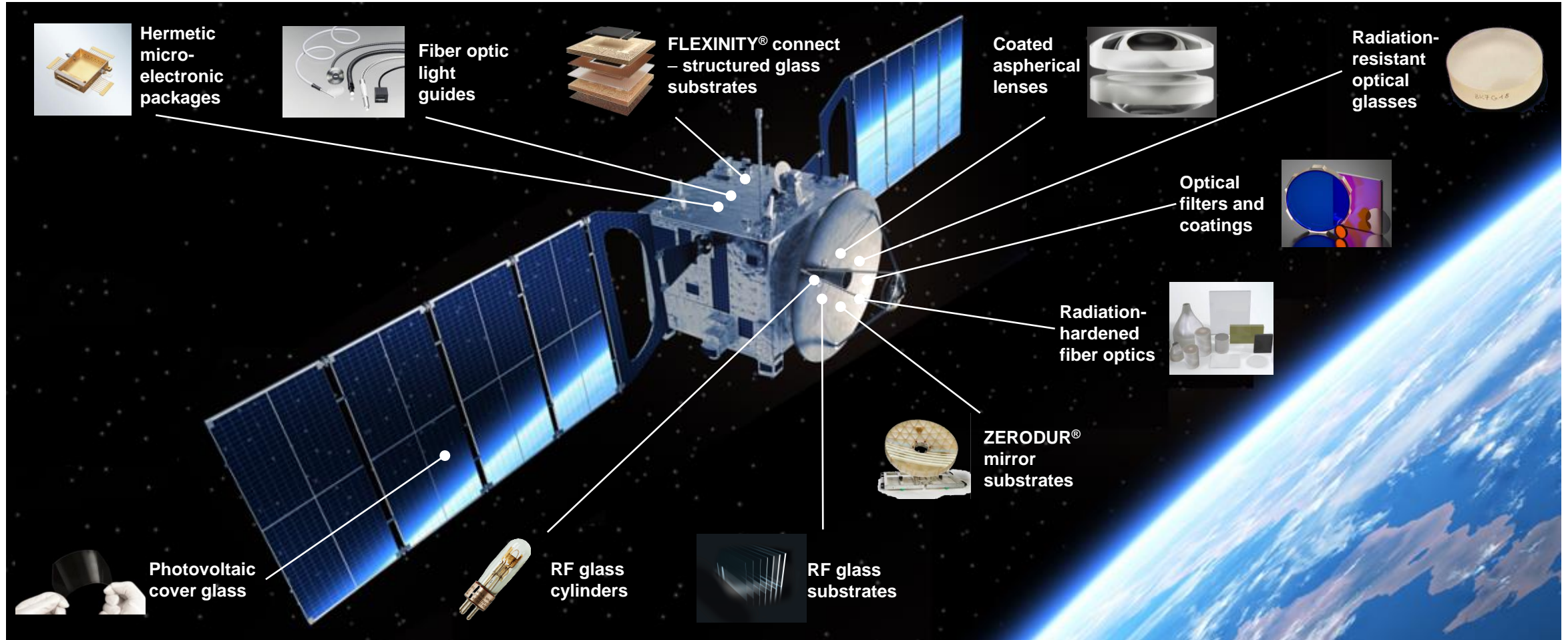
Your Ideas

- **Customized solutions** to match your design specific requirements

RF = Radio Frequency; SOEC = Solid Oxide Electrolyzer Cell

SCHOTT products enable a wide range of innovative solutions on board of satellites

SCHOTT's satellite product offering at a glance



RF = Radio Frequency

Contact



Boris Eichhorn

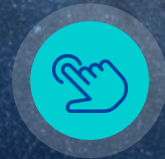
Senior Manager New Venture

boris.eichhorn@schott.com

+49 (0)151 / 1888 8981

www.schott.com

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