

Active Laser Glasses

Applications – USP – Availability – Capability

SCHOTT | Innovators at heart, enablers at work

FY 2019/20



€ 2.24 billion
sales
€ 288 million
ebit



16,500
employees



34
countries

Group operations are organized in three segments and seven business units



Home Appliances

Home Tech
Flat Glass



Precision Materials

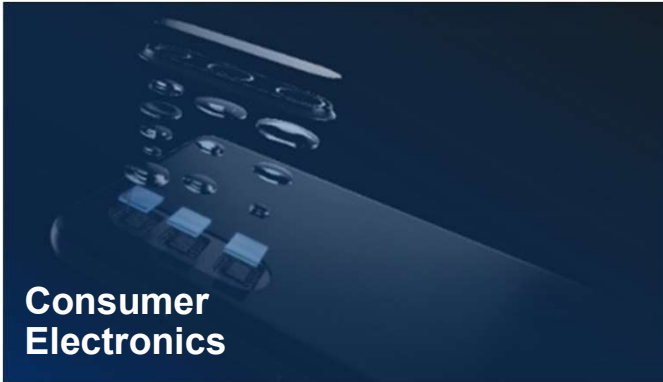
Pharmaceutical Systems
Tubing
Electronic Packaging



Optical Industries

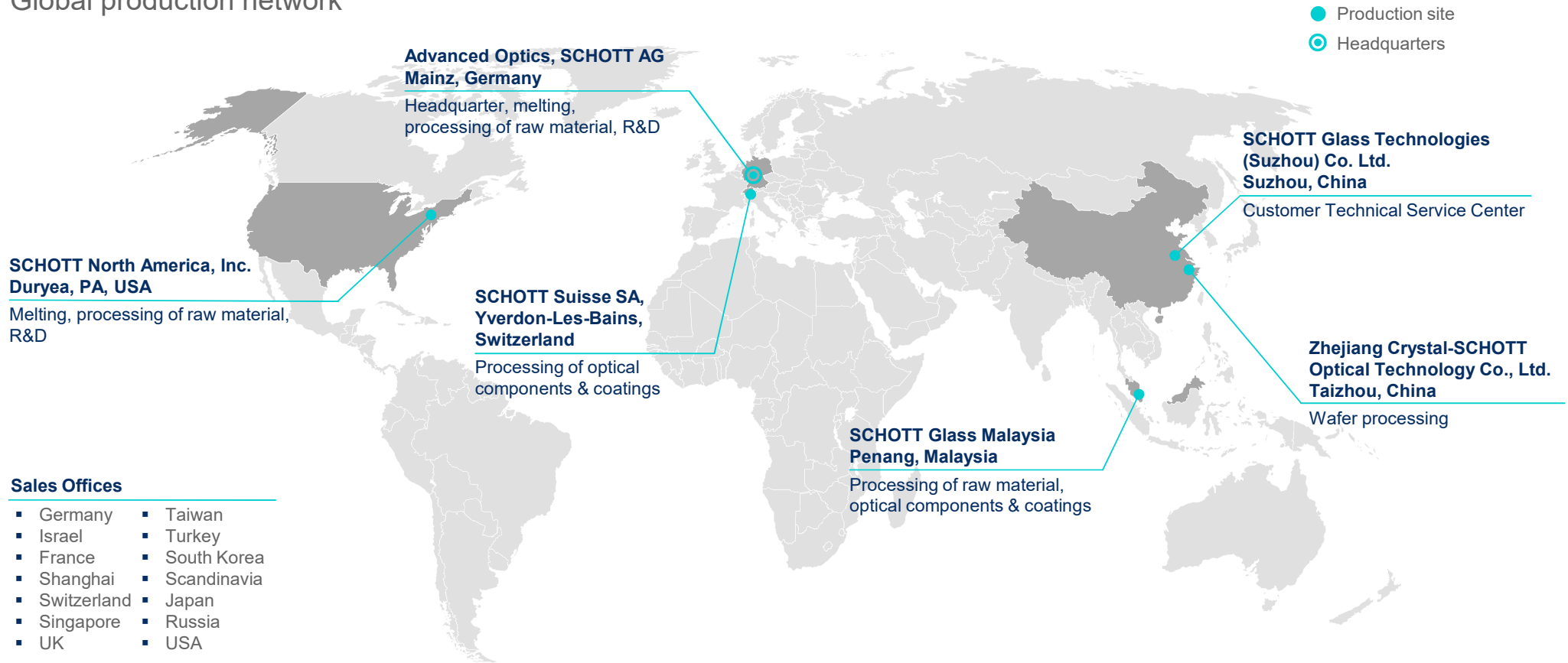
Advanced Optics
Lighting and Imaging

Our solutions support customers in challenging industries



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Global production network



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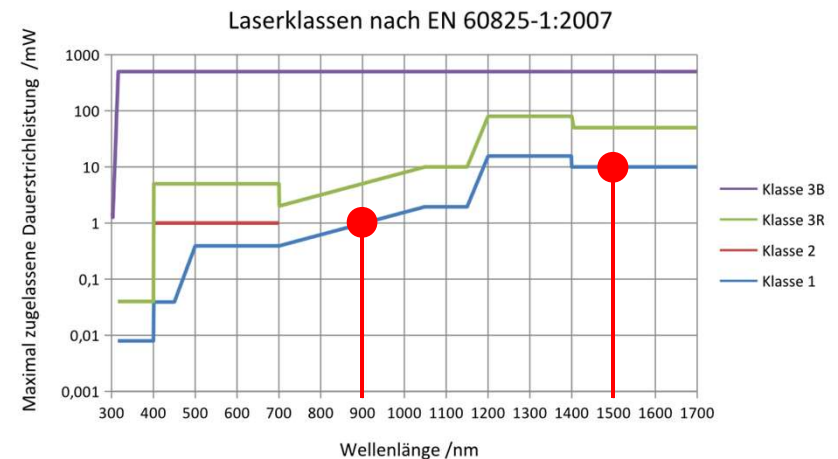
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glass made of ideas

What is the limiting factor for commercial available laser range finders

To reach the laser safety class I, the devices are designed to not exceed a certain power level when operation in the 1 μ m range

Principal work of a Laser Range Finder:

- Commonly used in for Laser Range Measurement in consumption, industry and automotive is the wavelength 905 nm, which isn't visible for the human eye
- PLD (Pulse Laser Diode) made out of AlGaAs (Aluminum Gallium Arsenide)
- PLD are perfect for ToF (Time of Flight) measurements
- Receiver is a Silicon Detector which has its max. sensitivity at 900 nm
- Max. power for a 900 nm laser is about 1 mW for laser class 1. Between 1,2 μ m and 0,7 μ m the cornea is partly transparent and the retina can be damage



In order to reach a high measurement range
power increase is needed

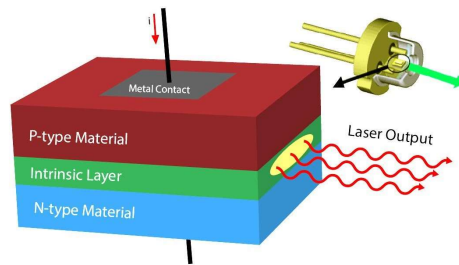
Problem: Laser Class I can not be reached anymore and the Pin Sensor Area (e.g. Area where the LRF can recognize the Pin on the green) is a problem.



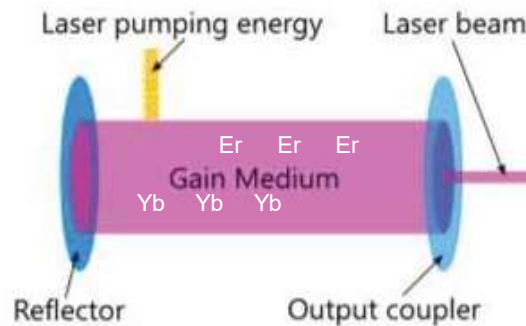
- Using "Eye Safe Laser" glass (like Erbium/Ytterbium doped glass) it is possible to increase Laser power 10 times and still be laser safety class I
- Benefit:** Performance in Range, Recognition and precision increases significantly. Up to 9000m

The advantage of Erbium-Ytterbium-doped Laser gain media in the eye safe laser waveband of 1,5 μ m

Erbium-ytterbium in the gain material generate a perfect interaction when efficient pump absorption in a available space is needed



Erbium-ytterbium doped laser materials are pumped with wavelengths around 975 nm [absorption peak of Yb³⁺ ions]

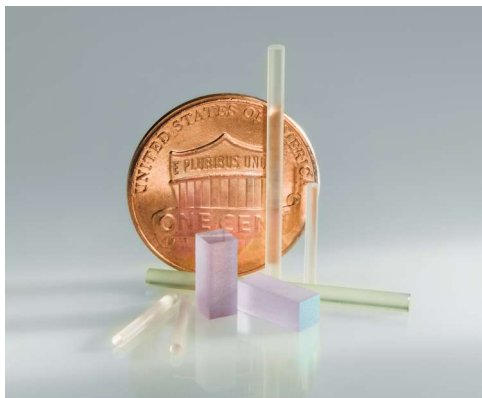


Essential advantage of using Yb co-doping is achievement of improved efficiency of pump absorption in a shorter gain medium piece

- The absorption transition cross section of Yb³⁺ is substantially higher than that of Er³⁺
- Common silicate glass can incorporate substantially more Yb than Er but with the problem of clustering



To avoid clustering you can keep the doping level low, but if you need a high output you need a different host material, e.g. phosphate glass



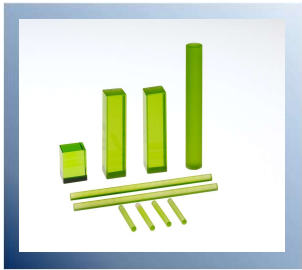
Ytterbium – Yb
Erbium – Er

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SCHOTT active laser glasses are the right choice when it comes to high or low power applications

Phosphate glass is the base for different doped laser glasses with its unique laser wavelength at 1,54 μm



Benefits

- "Eye-safe": Absorption in the cornea, lens, and vitreous humour of the eye
- Good athermal properties (stable operation in the -40 to $+50^{\circ}\text{C}$ range).
- Higher concentration of Er / Yb in glass possible than in Crystals
 - Er: Increasing laser output power
 - Yb: Increases transfer of pumping energy into Er
- High pump absorption in a short length of material
- Precision long range measurement (up to 20 km)
- Consistent beam quality and high homogeneity
- Pumping source [Diode] or [Flash lamp \rightarrow Cr needed]
- Wavelength advantageous for non-ablative skin treatment

Availability

- Polished and coated component
 - Length, width, diameter
1.0 – 20 mm
 - CT 3 – 100 mm
- Upon Customer Request

Contact

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