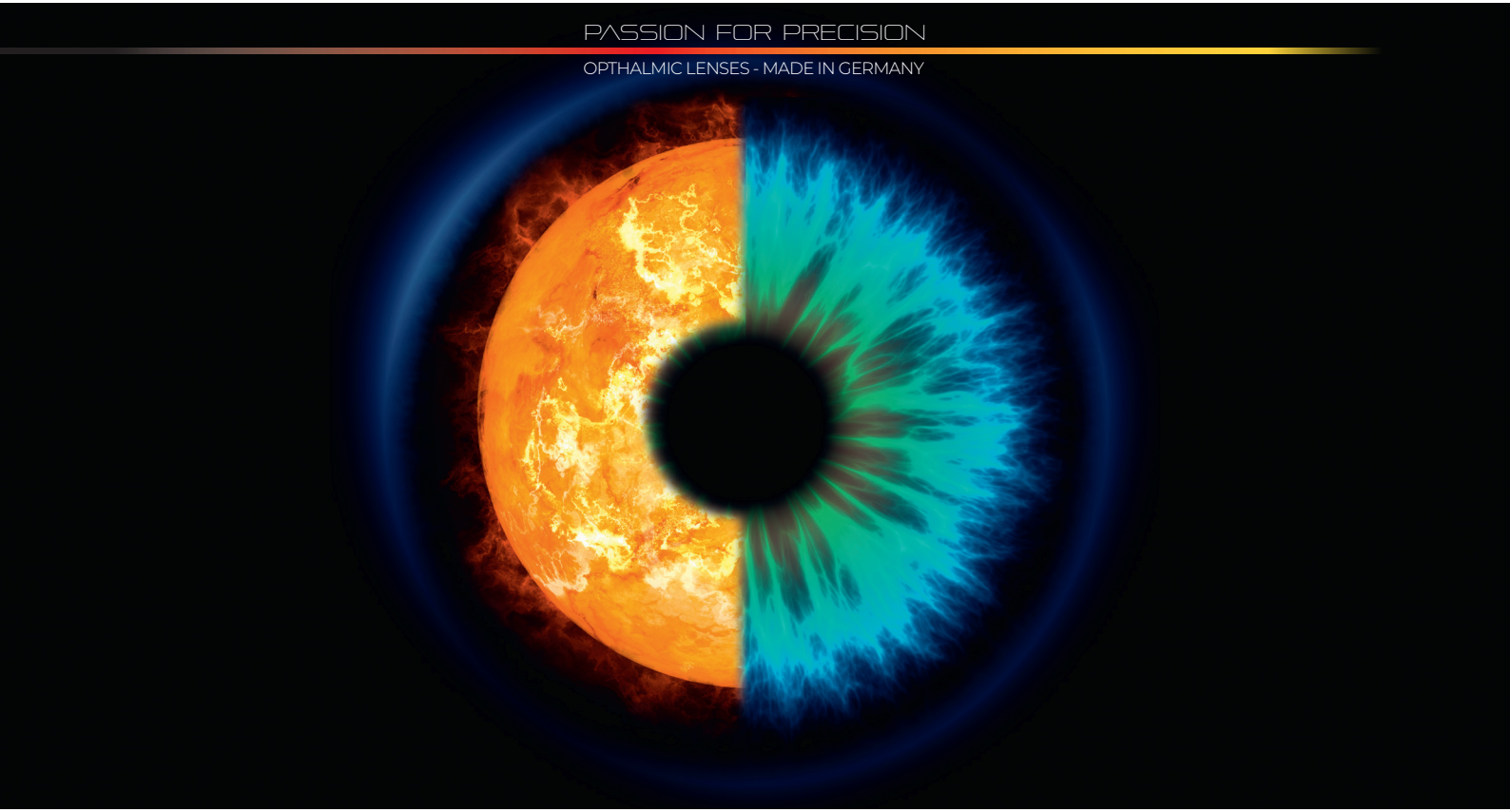
WETZLICH

PASSION FOR PRECISION

OPTHALMIC LENSES - MADE IN GERMANY



SaphirX IR

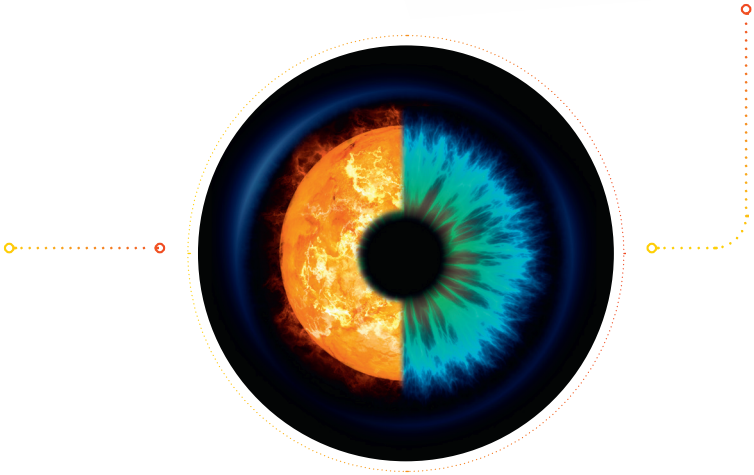
SaphirX IR INFRARED PROTECTION

Ultraviolette Strahlung (UV) | Sichtbares Licht (VIS) | Infrarotstrahlung (IR)

Why is infrared protection important?

The simple answer to this question is: On average, people live much longer nowadays. While the average life expectancy of a woman born in Germany in 1950 was 68.5 years, it has already reached 83.4 years for a woman born in 2015. This trend is expected to continue. As for our eyes, these are nothing more than “wearing parts". It is important to minimise wear, as in the long term, certain parts of the eye, such as the retina, cannot be repaired.

*Federal Statistics Office (2018): Development of life expectancy at birth in Germany according to sex between the years of 1950 and 2060 (in years).



Development of sunscreen products

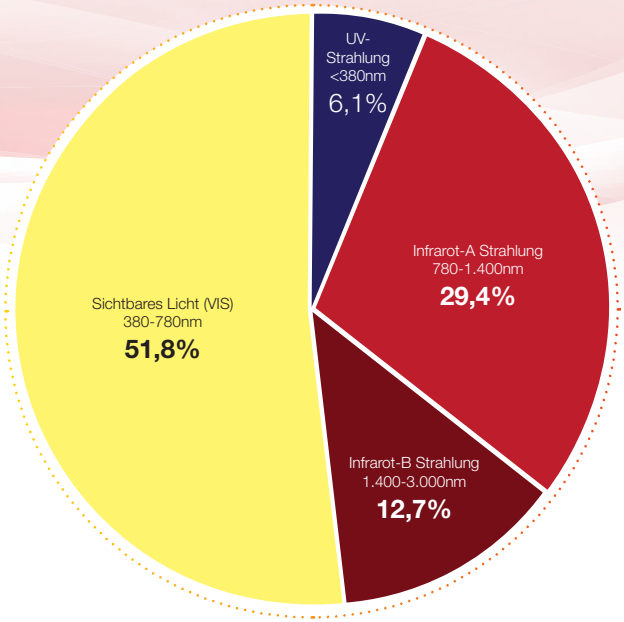
After initial suspicions in the mid-19th century that UV light could be harmful, Crookes sunscreens were released as early as 1913, providing a guarantee of 100% UV light protection. In 1908, the Swiss ophthalmologist Alfred Vogt managed to prove the health effects of UV radiation. In 1926, he published his combined findings demonstrating that ultraviolet light has a harmful effect on the eye. It it also worth noting that he had already pointed out that infrared radiation was suspected to have a similarly damaging effect.

In 1930, the first sunglasses began to be produced, with the primary focus still on preventing glare caused by sunlight. In addition to their use as a fashion accessory, protection standards for sunglasses were introduced, such as the last standard EN1836, which ensures complete UV protection, where 95% absorption occurs in a range up to 380nm. The more popular standard and one known to every wearer of sunglasses, is now the UV400 seal, which is even effective in visible light and also blocks harmful high-frequency blue light.

We wonder: What ever happened to infrared protection?

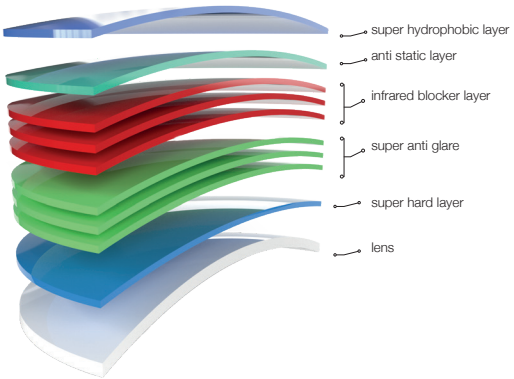
Infrared protection in other industries

In the field of dermatology in particular, research is already ongoing and there are relevant studies on the damage caused by infrared radiation, which have already been incorporated in the development of new sunscreen creams. The view taken by manufacturers of these sun protection products is: “without infrared protection you are only half protected from solar radiation” as infrared radiation represents more than 40% of the sunlight spectrum.



UV- & Infrared protection - Overview

- UV and infrared protection for your eyes
- Infrared rays comprise over 40% of the solar spectrum
- Clearly distinct from the “optician quality sun protection” offered by discounter goods (in petrol stations, pharmacies, etc.)
- Super-hydrophobic coating
- Clean & anti-static layer
- Multi-layer super anti-reflection technology
- Super-hard layer



Residual reflection colour

The glasses are visually very appealing, since the Saphir X IR acts like a subtle flash mirror-coating

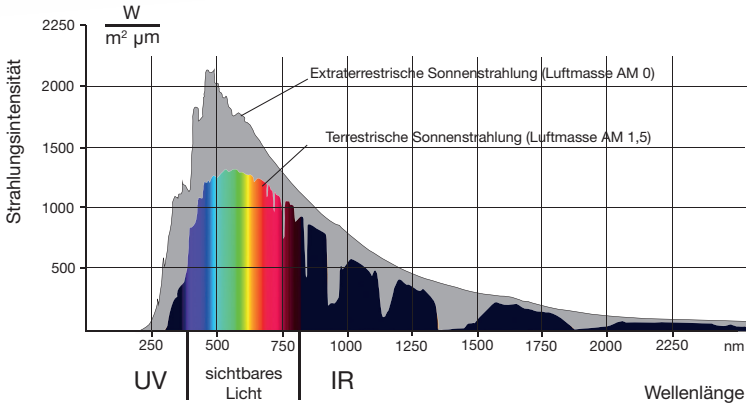
People who have undergone eye surgery (such as cataract surgery) require a particularly high degree of protection due to the loss of the ability to filter light through their natural lenses. Having UV and infrared protection your sunglasses and normal corrective glasses is therefore to be recommended, in order to prevent any further strain on the retinas, especially after such an operation.

Sunlight and Eye

The atmosphere already filters much more UV light than infrared radiation from the light spectrum. Since sunglasses do not yet absorb this section of light, infrared radiation, unlike UV light, still reaches the eye unfiltered - hitting a pupil that is far more dilated than without sunglasses.

Spectral range	Outside of the atmosphere	At the ground (sea level)
Infrared radiation	44%	42%
Visible radiation	47%	52%
Ultraviolet radiation	9%	6%

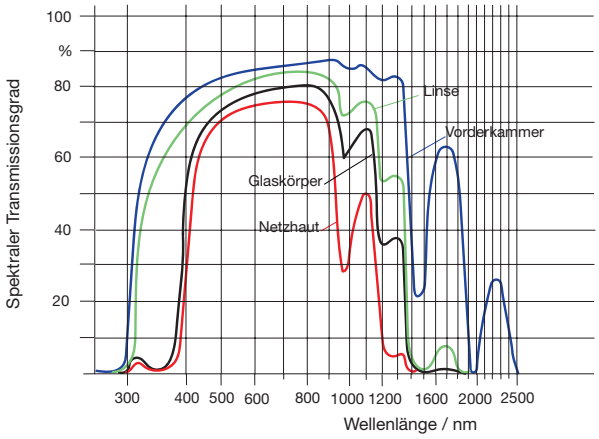
Association for Radiation Protection. "Visible and Infrared Radiation" Guidelines FS-2011-158-AKNIR



What reaches the eye?

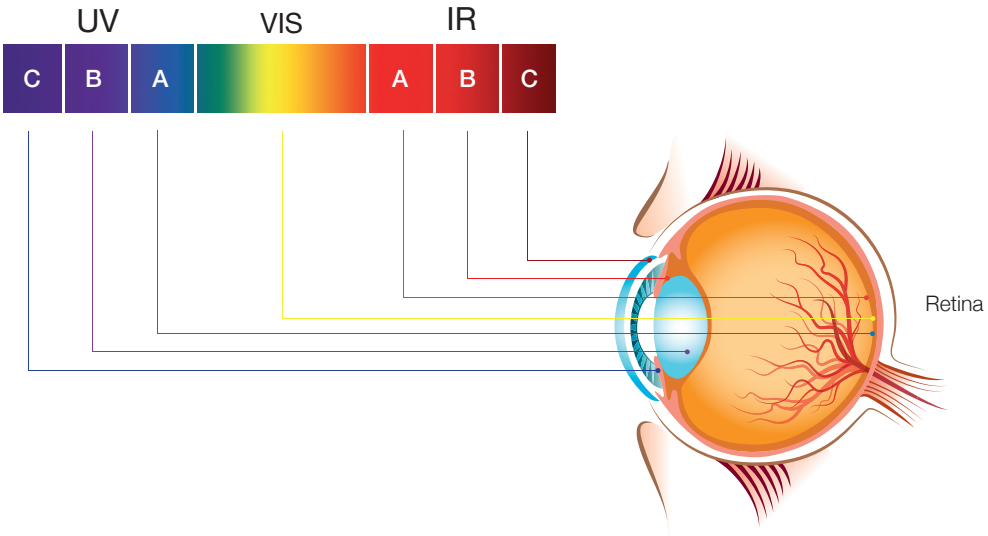
According to findings of the Association for Radiation Protection, infrared rays with a wavelength between 780 and 10,000nm can seriously damage the eye. In contrast to UV rays, the energy of the IR rays is not sufficient to cause photochemical reactions, but the rays lead to significant warming of the inside of the eye.

The key question to assess the damage caused is: What actually reaches which part of the eye?



The predominant IR-A component of sunlight penetrates in the range of up to 1,400nm with a significant proportion even reaching the retina. This simply a result of the general rule: The shorter the wavelength of the IR radiation, the deeper it penetrates. This particularly affects the chorioidea (choroid) which can become damaged by IR-A. This can lead to local tissue defects in the retina. Only a small amount of radiation with a wavelength greater than 2000nm is able to penetrate the cornea. The anterior chamber absorbs all radiation over 2000nm. All wavelengths larger than 1400nm are filtered out through the lens and vitreous humour.

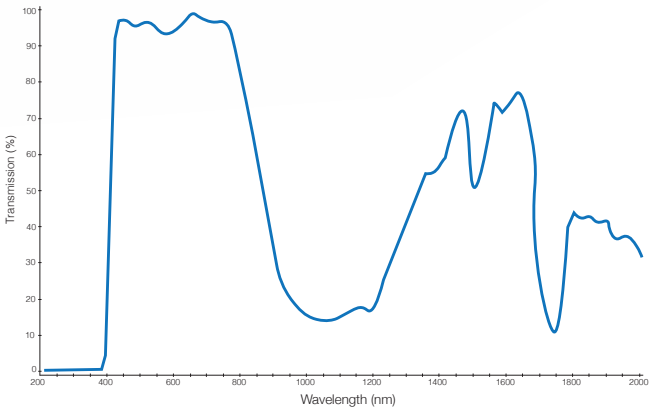
Radiation within the wavelength range of 400nm to 1400nm the is therefore able to reach retina. The energy of infrared radiation absorbed by the eye results in warming (Vos and Norren 2004, Brose et al., 2005). The exact mechanism of action which leads to turbidity of the lens (cataracts) during long-term exposure to IR radiation, is still uncertain (Brose et al., 2005). It is also difficult to distinguish between fundamentally multifactorial, age-related cataract development with a variety of biochemical changes - in particular changes in the composition of lens proteins with increasing aggregations of water-insoluble high molecular weight proteins - and cellular changes that are genetically modified and enhanced and exacerbated by environmental factors (Truscott and Zhu , Michael and Bron, 20122). *This is, however, precisely why certain cataract diseases are called “fire gaze” or “glass-blower’s eye”, meaning that the influence of infrared radiation on such formations, although these develop very gradually and are difficult to test, is considered difficult to prove, but considered highly likely.



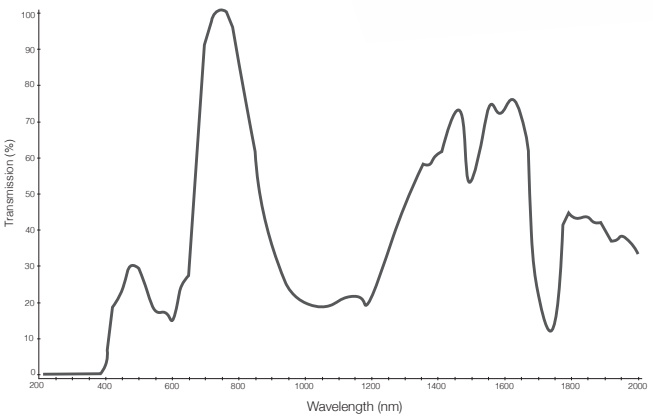
*Guideline of the German Society of Occupational Medicine and Environmental Medicine. Work with exposure to infrared radiation (heat radiation) - Dangers and damage to eyes and skin (AWMF Register No. 002/010 Class: S1 02/2012).

Technical data (Transmission)*

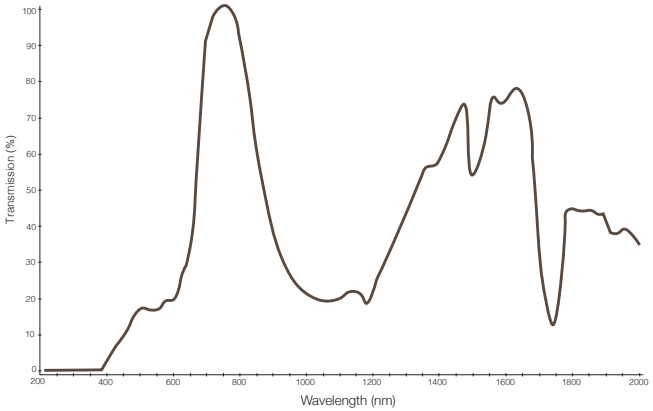
1.60 Saphir X IR White



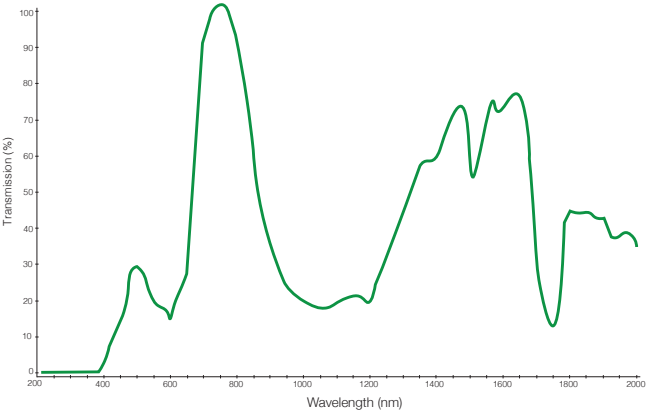
1.60 Saphir X IR Grey



1.60 Saphir X IR Brown



1.60 Saphir X IR Green

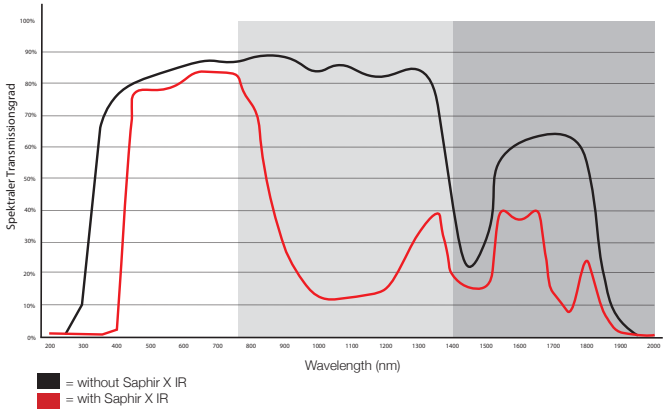


* Currenta, analytics surface and solid state analysis. Test report for Wetzlich Optik-Präzision GmbH - Saphir X IR, 2019.

Effect on eye

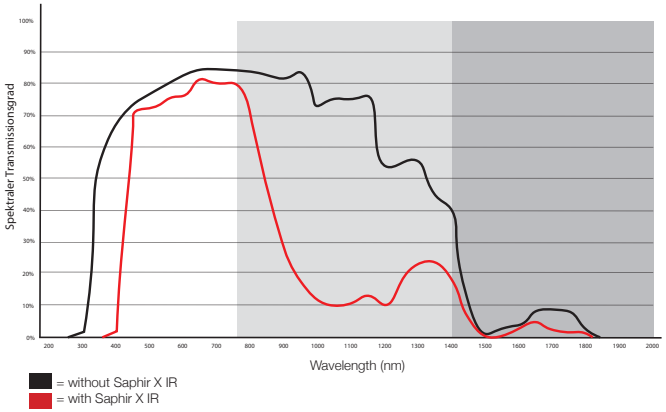
780 to 1400nm = 67% IR-A reduction
1400 to 2000nm = 51% IR-B reduction

Front chamber



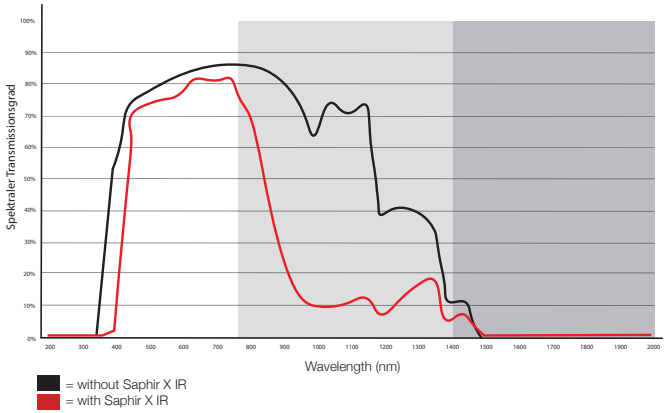
= without Saphir X IR
= with Saphir X IR

Lens



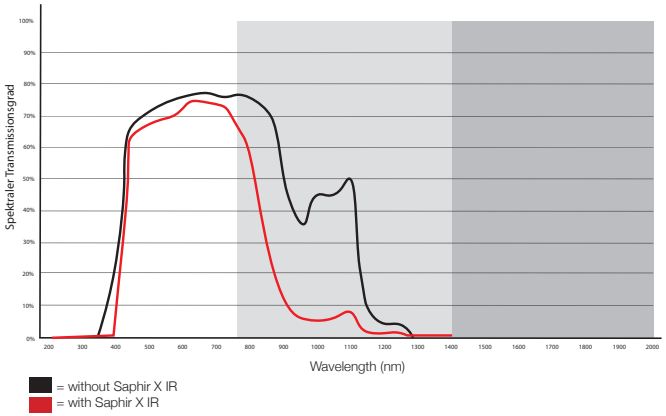
= without Saphir X IR
= with Saphir X IR

Vitreous



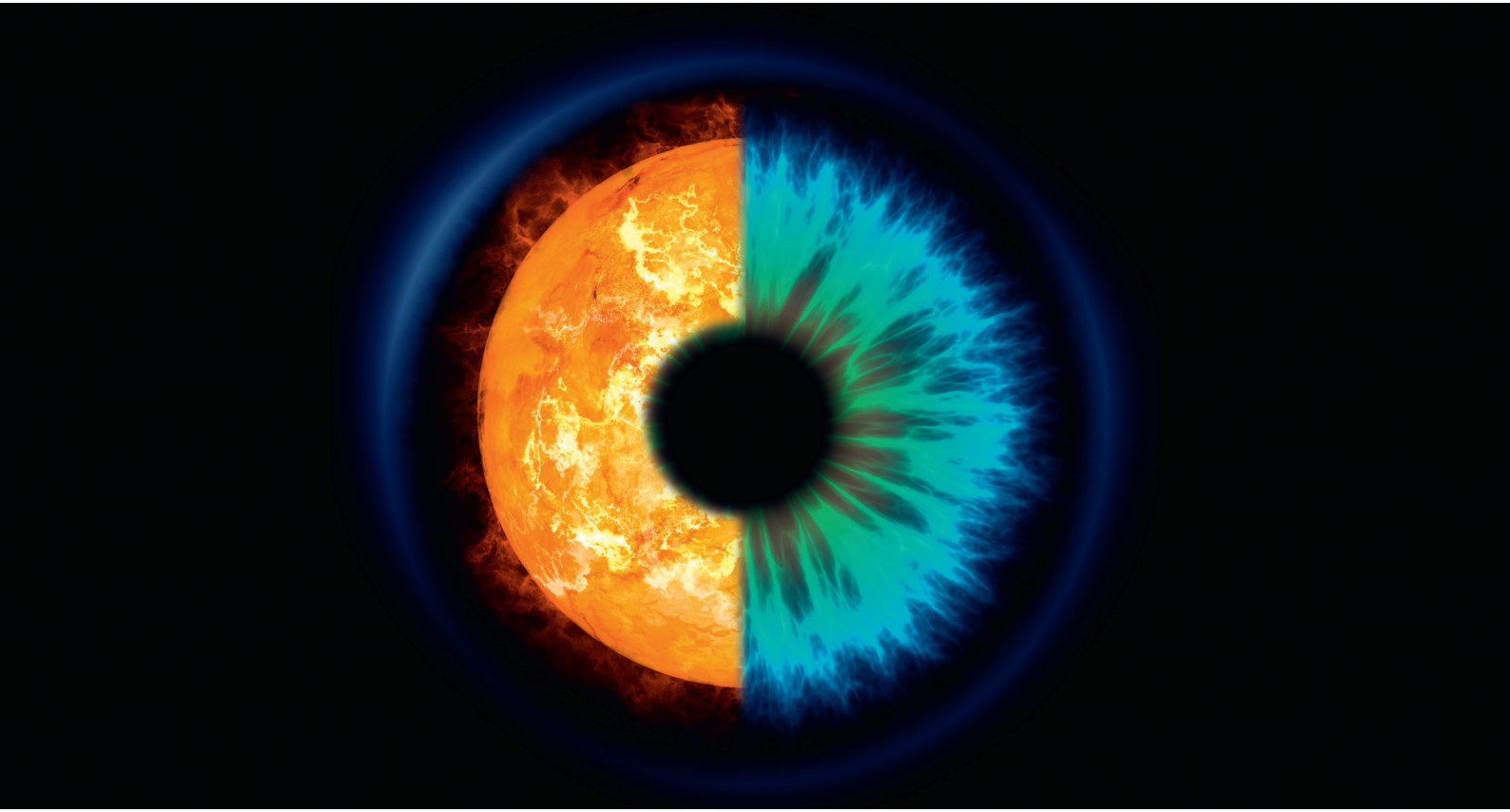
= without Saphir X IR
= with Saphir X IR

Retina



= without Saphir X IR
= with Saphir X IR

WETZLICH



Wetzlich Optik-Präzision GmbH
Friedrich-Ebert-Str. 9-11
41352 Korschenbroich, Germany

Phone: +49 21 61 / 56 33 0
Email: info@wetzlich.de

www.wetzlich.de
www.wevinet.de