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LEDPRO[®]

LED light controlling lens

The first patented ophthalmic lens technology
featuring cutting edge optical performance and
enhanced comfort for users
exposed to LED light.

**YOUNGER
OPTICS** 
The Optical Lens Innovators

Patent No.:
US 8,911,082 B2

ledprolens.com

What is LED light?

Light Emitting Diodes (LEDs) are an amazing invention that has radically altered the illumination of our world.

An LED is a semi-conductor that emits light when an electrical current passes through it. Though it was discovered back in 1927, it was only at the end of the 20th century that the highly efficient blue-light LED was invented, revolutionizing illumination technology. LED light bulbs

consume 90% less energy than conventional ones, dramatically reducing energy consumption. Each LED emits light in a very narrow spectrum. To achieve white light, multiple LEDs of different colors are combined. Because of this, the spectral range of LED light

is not uniform across the visible light spectrum.

Most popular white LED lights emit brighter light at 450 nm and 590 nm than at other wavelengths, creating sharp peaks in the spectral chart at these locations.

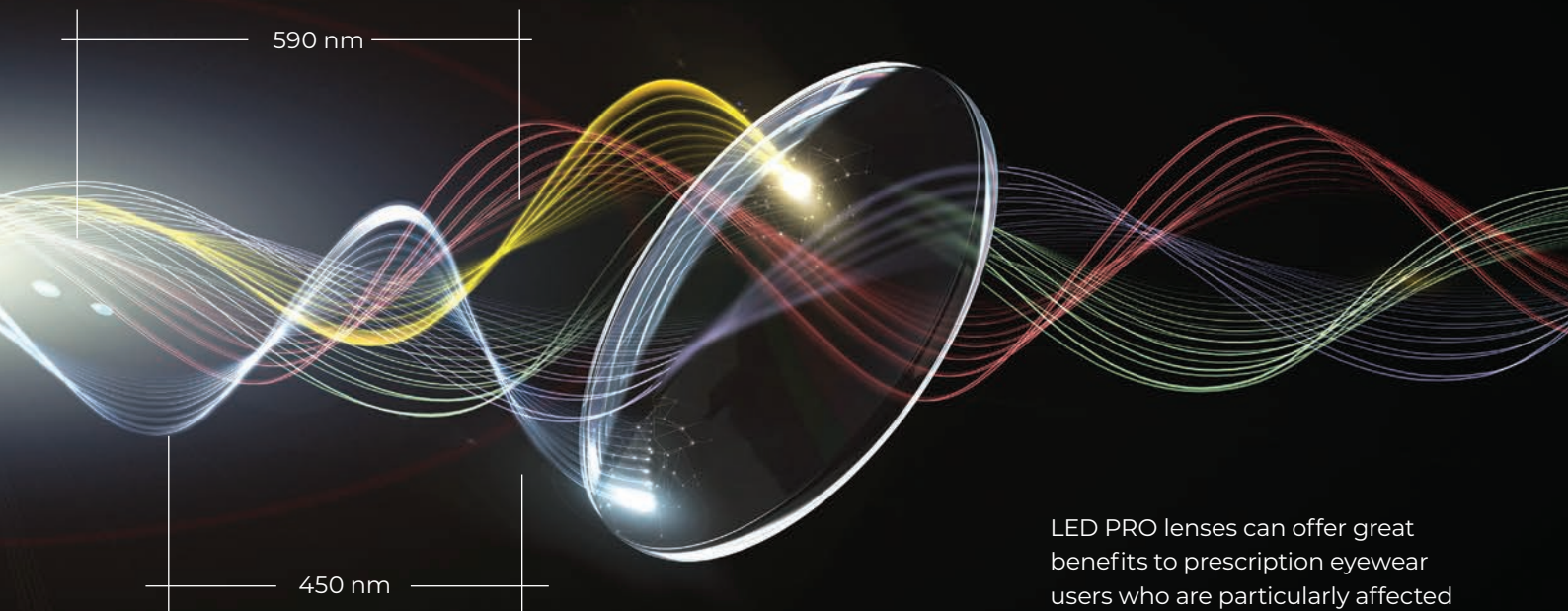
LED light & vision

Due to its energy efficiency and to accommodate for its narrow spectrum, the luminance of LED lighting is much higher than of traditional light technologies. This added brightness is both an advantage and a disadvantage. It improves visibility in the dark, but also creates discomfort and visual fatigue for many people, especially after prolonged exposure or when pointed directly into the eyes.

In today's world, our eyes are constantly exposed to LED light. Studies have shown that people who require visual correction are more likely to experience LED-related discomfort.

LED light control

LED PRO absorption dyes control light intensity at 450 nm and 590 nm to eliminate vision discomfort.



LED PRO lenses can offer great benefits to prescription eyewear users who are particularly affected by LED light.



LED PRO lenses can be used in primary eyewear. In every situation, they benefit the wearer by reducing LED-related discomfort without compromising vision.

Because of the absorption of a portion of visible light, LED PRO lenses have slightly visible green hue. However, combined with efficient AR coating, they transmit almost 90% of visible light, passing all required standards for Class 1 eyewear with no use limitations.

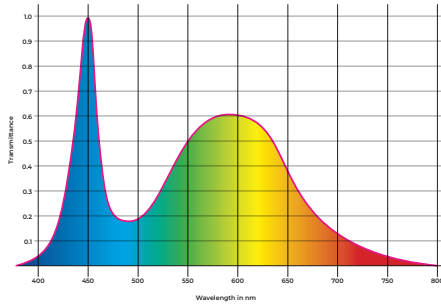
LED PRO lenses block 100% UV light, as well as high-energy visible light up to 400 nm, offering great eye-health benefits in addition to the enhanced comfort under LED light exposure.

How LED PRO lens works

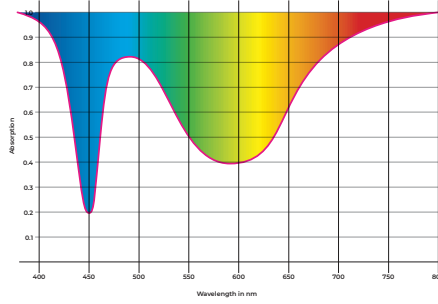
LED PRO utilizes a new technology of selective wavelength light absorption dyes. Instead of absorbing light across the whole visible spectrum, these dyes absorb a narrow band of

the light spectrum at two specific wavelengths. Younger Optics R&D developed and patented the lens with high absorption at 450 nm and 590 nm wavelength.

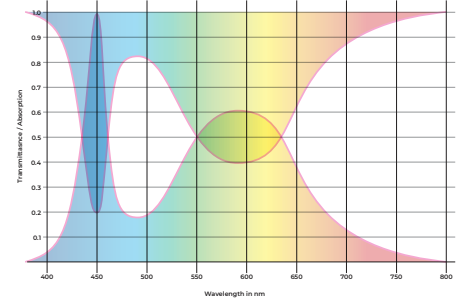
As a result, the LED PRO lens attenuates the emission peaks of LED lights, reducing the blinding effect of direct LED lights, as well as the visual fatigue of prolonged exposure.



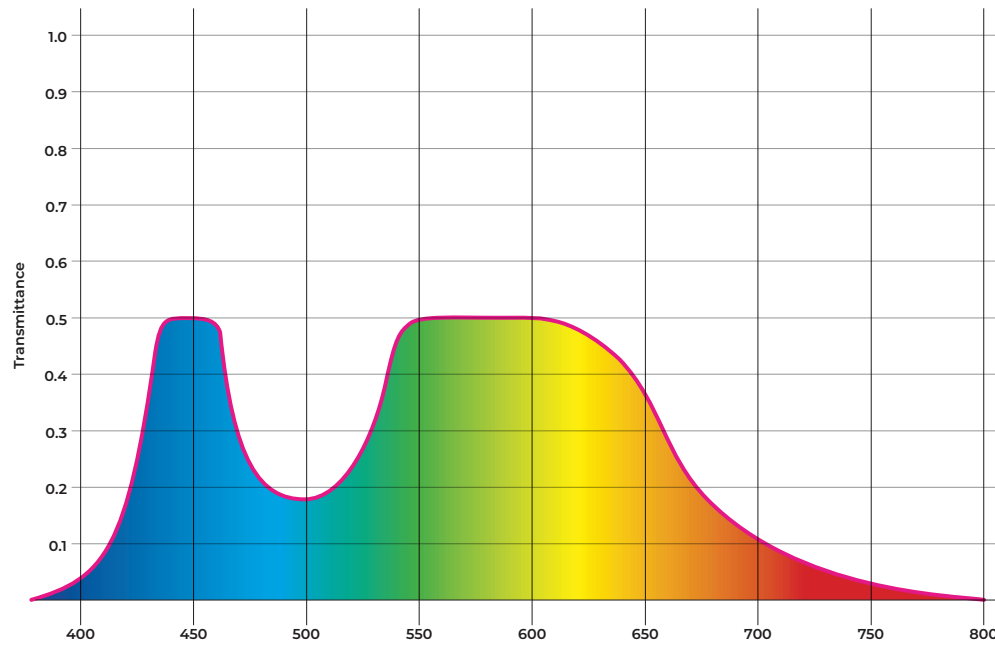
Visible spectrum of LED light



Absorption of LED PRO lens



Blinding LED light peaks reduced



LED output filtered by LED PRO

Spectral graphs are theoretical. Real LED light spectral output may vary slightly.

LED PRO benefits

NIGHT DRIVING

Most cars today use LED headlights, taillights and even car perimeter lights. While providing much better visibility for the drivers, LED headlights, being generally stronger and highly focused, can create a blinding effect for other drivers on the roads, especially on the opposite side of the road. Drivers who spend longer driving in the dark can also experience heightened visual fatigue because of the constant exposure to LED headlights and taillights.

SPORT ARENAS

People who engage in sport activities under artificial lighting, are exposed to very strong LED illumination. Tennis, paddle tennis, football, cricket, baseball and other evening activities often expose participants to visual fatigue and general discomfort due to LED light's strong presence.



INDOORS LIGHTING

Almost all indoor illumination today is LED, especially in industrial environments. It is usually stronger and brighter than conventional lighting, and long exposure to it can lead to visual fatigue. LED Pro lenses can improve the comfort of prescription lens wearers by attenuating the strong emission at 450 and 590 nanometers.



LED MONITORS AND COMPUTER GAMES

Most computer monitors and game consoles use LED technology. It is known that prolonged exposure to LED light may cause visual fatigue and even headaches for some people. LED PRO lenses mitigate this effect, which can improve eye comfort for computer users and gamers.





LED light controlling lens

LED PRO lenses clinical study results

METHODOLOGY *. Participants rated their satisfaction with standard lenses and LED PRO lenses while performing specific tasks at different distances.

A satisfaction survey was completed to assess the initial wearing experience, using a scale from 1 (worst) to 5 (best).

1.

100% rated LED PRO lenses 4 or higher for glare and reflection reduction, vision in artificial light, adaptation ease, and lowlight vision.

2.

90% rated LED PRO lenses at 4 or higher for visual comfort and vision in natural light.

3.

80% rated LED PRO lenses at 4 or higher for visual fatigue, color perception, and overall vision.

*Detailed description of methodology, tests and equipment is available.

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Younger Optics, Torrance, CA, USA, www.youngeroptics.com
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