

BLUE LIGHT IN DISPLAYS AND LIGHTING: USING SPECTRORADIOMETERS TO MEASURE BLUE LIGHT

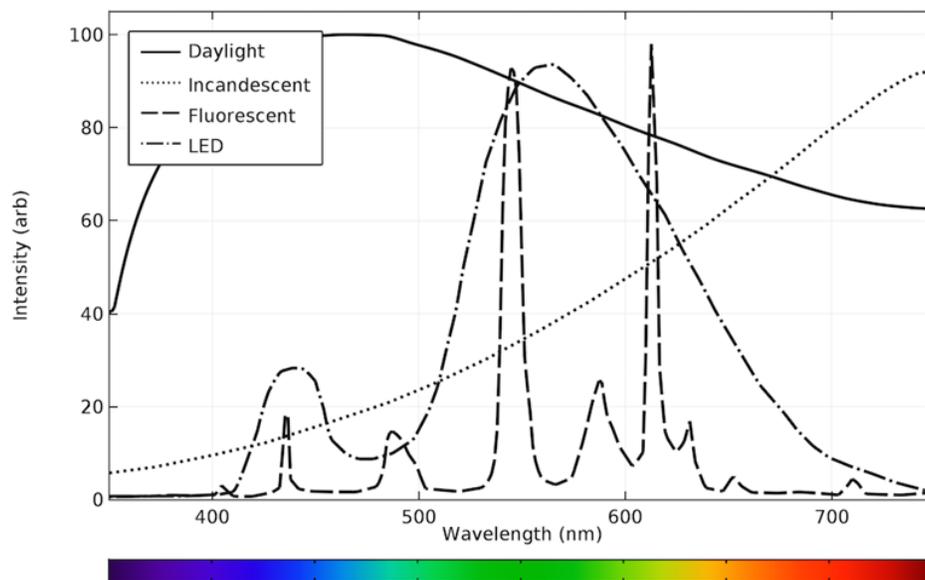
By Dr. John R. Hayes, Ph.D., FAAO

THE BENEFIT OF BLUE LIGHT

In natural outdoor sunshine, blue light peaks at 480 nm. This stimulates photosensitive Retinal Ganglia Cell (pRGC) in humans' eyes to synchronize daily circadian physiological rhythms to the light and dark cycles. This is what keeps humans alert, a natural biological mechanism to let the body know when it's time to be active and focused, or conversely when it's time to rest.

BLUE LIGHT INDOORS AND IN DISPLAYS

Unfortunately, indoor lighting doesn't typically peak at 480 nm in the blue. Displays, such as laptops, monitors and cell phones, typically emit with a peak blue wavelength of 435 nm. At this level, blue light oxidizes to A2E, a waste product stored in the retina. This can lead to dry eye macular degeneration in older adults. There is also a correlation between lack of outdoor lighting and myopia in humans.

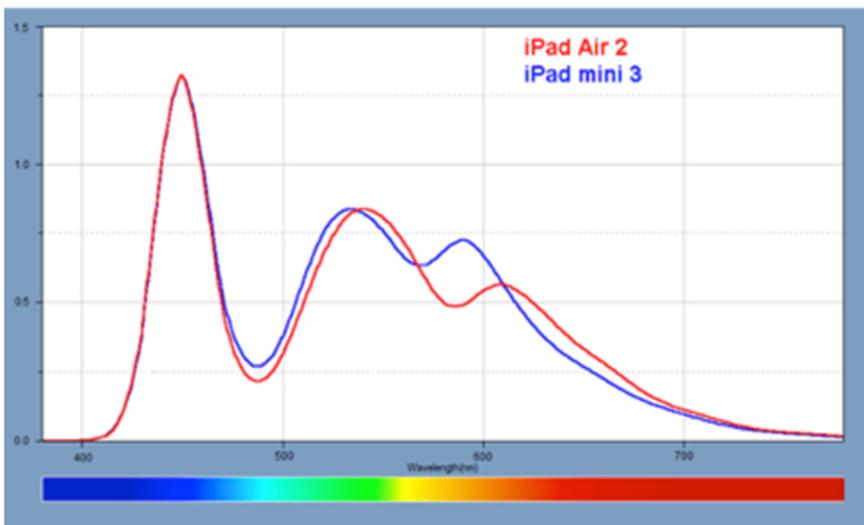


PR-670 Used for Measurement

Blue Light in Displays and Lighting

MEASURING BLUE LIGHT

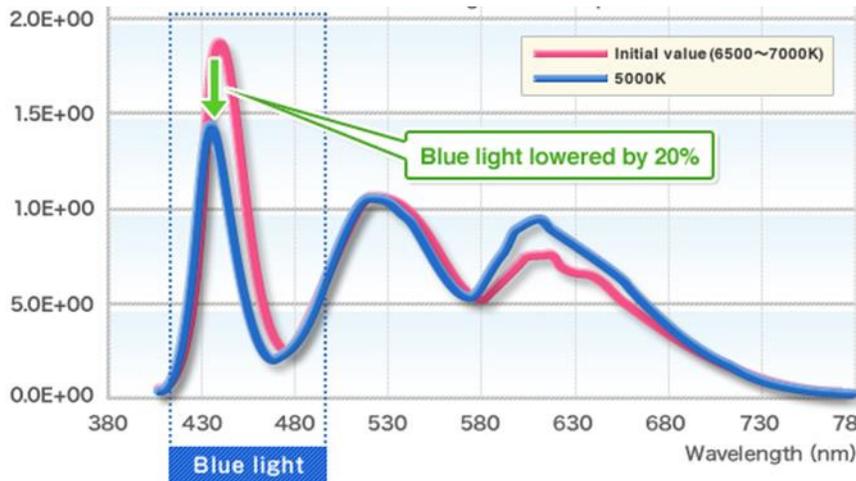
Spectroradiometers can be used to measure blue light, providing spectral power distributions (or spectral radiance) and peak wavelengths. Using a spectroradiometer, monitors and cell phones can be tested for spectral distribution to identify normal operating mode, the effect of reducing blue operating mode, the effect of adding yellow filters, and the effect of adding yellow filters and reducing the blue mode. By turning down the blue in monitors, using yellow filters and adding 480 nm LED lighting, research can be done to determine the impact on humans' EEG patterns of alertness and increased performance on cognitive tests.



<http://www.iphoneincanada.ca/ipad/ipad-air2-anti-reflective-coating-innovative/>

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<http://www.eizoglobal.com/library/basics/eyestrain/index.html#tab03>

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Dr. Hayes is a Professor at the College of Optometry at Pacific University Oregon. He uses the Photo Research PR-670 Spectroradiometer in his research.