Health is Wealth

As the lighting world continues to move towards healthier, more human-centric lighting, Soraa launched Healthy, its no blue LEDs at LightFair International this May. Also appearing at [d]arc room in September, David Morgan puts the new LEDs under the microscope.

When Shuji Nakamura, Nobel Prize-winning scientist and one of the inventors of the blue LED in the 1990s helps develop and market a new range of LED retrofit lamps in 2015, that produce no blue light, at first it would seem to be a significant change of direction. However, on further investigation, Soraa Healthy no blue lamps are a seemingly logical development of the original LED technology created by Nakamura's company, Soraa.

Nakamura was responsible for developing a cost-effective process to manufacture blue LEDs in 1993 whilst working at Japanese chemical company, Nichia. From this invention the production of white LEDs became possible by using the blue light at around 430nm to excite green and red phosphors in the LED package to produce white light. This approach became the basis of most LED emitters and retrofit LED lamps ever since, for the past couple of decades.

In recent years concerns have arisen over the effect that blue light may be having on human and animal circadian rhythms. While all commonly used light sources including fluorescent and incandescent lamps do produce blue light as part of their spectrum, most LED sources emit higher levels of blue.

Several recent studies have demonstrated that blue light has a powerful effect on controlling the human circadian rhythm, with blue rich light in the morning helping us to wake up and increase our alertness, however in the evening the blue part of the spectrum suppresses melatonin production, which is necessary for healthy sleep. A reduction in melatonin production affects our circadian rhythm and delays the onset of sleep.

As we spend increasing amounts of time working and living under artificial light and using devices with backlit LED displays, the quality and composition of the spectrum is being investigated in more detail to ensure that it does not lead to health problems. Research is ongoing, but these findings apply pressure for light sources that eliminate blue light to be readily available.

Shuji Nakamura left Nichia in the late 1990s, and in 2007 founded a new company, Soraa, in conjunction with other pioneers from the worlds of engineering and semiconductors; Dr Steven DenBaars, founder of Nitres; and Dr James Speck of U.C. Santa Barbara's College of Engineering. With funding from Vinod Khosla to develop and commercialise GaN on GaN technology, they joined forces.

The first generations of full spectrum white light Soraa lamps utilised the nearly flawless crystal structure of Soraa's GaN on GaN LED to operate at currents that are more than five times higher than LEDs built on non-GaN substrates such as sapphire or silicon carbide. As a result, Soraa's LEDs emit five times more light from a given LED area than any other LED. The advantage of the smaller light-emitting surface area being that when used in conjunction with an advanced prismatic lens, narrow beam angles, as narrow as 9-degrees, can be achieved. Using a single emitter also results in a single sharp shadow that is very similar to halogen.

Soraa lamps have always been based on a purple light emitter with an output starting at around 400nm, which combined with RGB phosphors creates a high efficiency full spectrum white light.

However, the latest exciting breakthrough for Nakamura and his colleagues at Soraa has been to utilise the purple LED emitter to excite a specially developed phosphor based on only red and green, thus resulting in patented ZEROBLUE technology, which has been incorporated into the new range of Soraa Healthy lamps.

With ZEROBLUE, Soraa Healthy products emit a blue-free white light that does not disturb circadian rhythms and apparently produces around 40% less melanopic lumens than traditional LED lamps. It is understood that while previously marketed low blue LED lamps are available on the market, they produce an amber coloured light with low CRI, whereas Soraa's Healthy lamps claim to produce a warm white light output with a CRI of 80.

Intrigued by this latest development from the team at Soraa, and interested to find out more, I carried out some simple tests to compare the lit appearance from a 36-degree MR16 Soraa Healthy lamp with an MR16 Soraa 2,700K Vivid 95 CRI lamp, and there were some obvious differences. The Healthy lamp does have quite a yellow white appearance compared to the Vivid lamp. The blues and greens are reasonably well rendered but rather muted when compared to the Vivid lamp. I would suggest this is not an ideal light source to use to light fruit and vegetables – particularly those with green skins. However, when used in a general lighting situation the lit appearance is pleasant and renders skin tones well.

The Healthy range has been available in the US consumer market for the past year and is now being marketed internationally and for professional use. The range of lamp types includes MR16, GU10, GLS and reflector shapes.

It is understood that Soraa will be introducing luminaires based on the ZEROBLUE technology later this year, and that tuneable white lamps may be introduced at some point where the blue light level would fall to zero as the colour temperature is lowered.

It is clear that Soraa has effectively developed its technology to address an issue of increasing interest and concern. It will be interesting to see which markets adopt the Healthy lamps most enthusiastically. I would imagine that they would be used extensively in care homes where dementia patents suffer from disturbance to their circadian rhythm and would benefit from zero blue emitting light sources. There are certainly many applications that would benefit from Soraa's latest offering, and it certainly has a place in the market. Our health and quality of life is an ever-pivotal topic and Soraa is responding well to this trend by offering a solution, which in the words of Soraa, is said to be 'sleep friendly, looking as good as it feels!'. This is certainly one to watch! ■

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