X-Cite®
Fluorescence Illumination • In Control

LaserLED Hybrid Drive® filling the "Green Gap"

Application Overview

Microscopy and fluorescence excitation have traditionally relied on the spectral properties of the mercury arc lamp which has defined the chemistry of fluorophores, as well as the excitation and emission filters used in fluorescence imaging. The mercury arc lamp has discrete peaks around which the most common fluorophores namely DAPI, FITC, and TRITC have been developed and used for decades. With technology moving to LEDs, users must be aware of the differences in the peak optical power between lamp and LEDs, and ensure optimization of their filters in order to achieve maximum excitation efficiency of their fluorophores.

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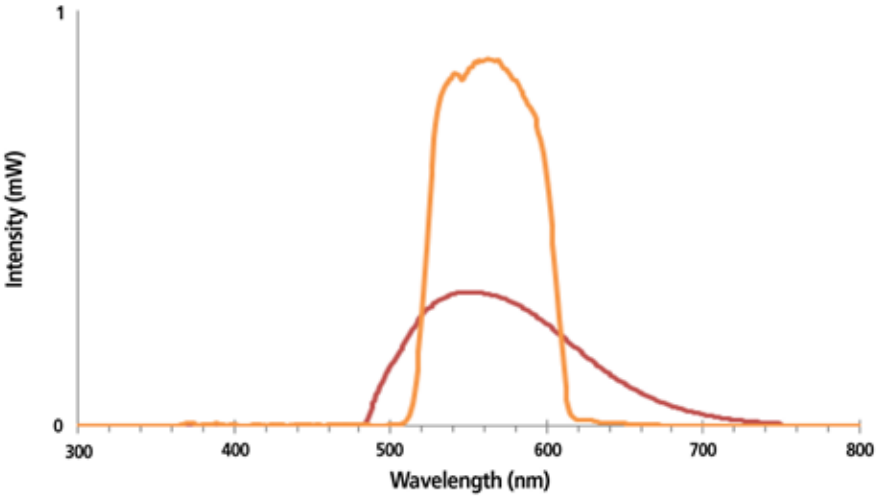
The Challenge

The "Green Gap"

Manufacturers are challenged by designing fluorescence illumination systems that cover the same spectrum as the traditionally used mercury arc lamp in order to adequately excite common fluorophores used in fluorescence studies. The challenging wavelength band is between 540–590 nm, known as the "Green Gap". LEDs in this region of the spectrum are fundamentally limited by the lack of semiconductor materials to efficiently emit light at this wavelength. Some manufacturers have generated innovative solutions to bridge the gap including: LED arrays, wavelength conversion phosphor technology, and laser solutions.



LaserLED Hybrid Drive used to increase output power in the Green Gap.

= Typical power at this wavelength.

= Power achieved using LaserLED Hybrid Drive.

The Solution

Wavelength conversion using phosphor materials has been used in the lighting industry for a long time. Shorter wavelength light (blue, violet, UV) is absorbed by a material that re-emits light of a longer wavelength via phosphor conversion. The X-Cite® TURBO and X-Cite XYLIS, offered by Excelitas Technologies use patented (US #9,239,133) laser phosphor conversion technology to generate high power light in the 540-590 nm region. The term LaserLED Hybrid Drive refers to the combination of Laser and LED technology within the unit to generate high power excitation light. To successfully take advantage of LaserLED Hybrid Drive, the X-Cite systems take into account all thermal, electrical, and optical parameters to maximize light conversion and delivery of light to the sample. The LaserLED Hybrid Drive has the ability to be more efficient than other phosphor conversion techniques, and was recognized with a 2016 Microscopy Today Innovation Award.

The Benefit

Combining LED, laser and phosphor technologies can create an effective solution to fill the green gap and produce an optical spectrum that meets the needs of users interested in exciting common fluorescent proteins and fluorophores. The X-Cite TURBO and X-Cite XYLIS use LaserLED Hybrid Drive to provide superior illumination uniformity and maximum light delivery at all wavelengths, enabling users to excite common fluorophores including mCherry (formerly in the Green Gap) used in fluorescence detection and imaging applications.

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2260 Argentia Road
Mississauga, Ontario
L5N 6H7 CANADA

Telephone: +1 905 821-2600
Toll Free (USA and CAN): +1 800 668-8752
Fax: +1 905 821-2055

For a complete listing of our global offices, visit www.excelitas.com/locations