Crystal IS
High Performance UVC LEDs

MINI-WHITEPAPER:

Advantages of UVC LEDs in Instrumentation:

Benefits of LED Instant On/Off Feature

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Benefits of LED Instant On/Off Feature

Design engineers are starting to seek out new UV light sources to meet the demands of spectroscopy instruments in life sciences and environmental monitoring markets. The instant on/off features of LEDs make them attractive alternative to traditional UV lamps in these applications.

Instant On and Instant Off

When instrument light sources are turned on, there is a slight delay for the light source to reach full brightness. Depending on the light source, this "delay" may be less than a microsecond or a number of minutes. LEDs reach full, stable brightness in less than a microsecond. For UV lamps, which require a period of minutes to reach full brightness, there is a fluctuation in the stability of light during this time. These lamps will require a warm up time before measurements can be taken.

Figure 1

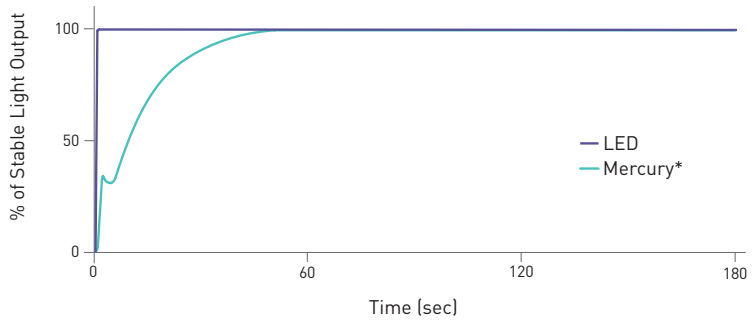


Figure 2

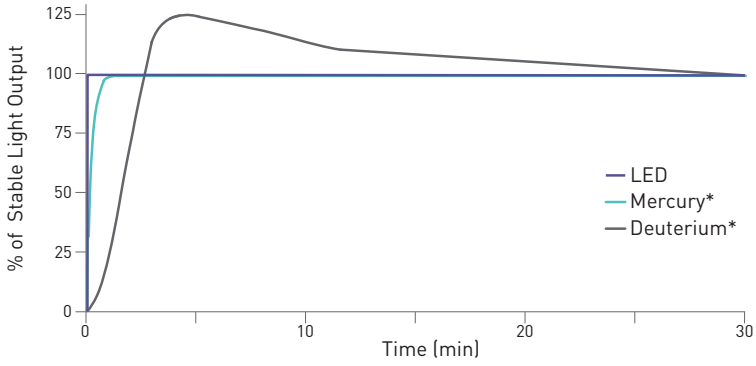


Figure 1 illustrates the percent of stable light output seen in an LED compared to a UV Mercury lamp over 180 seconds. Figure 2 shows the warm-up period required for a Deuterium lamp to reach thermal equilibrium.

**Data is pulled from typical product literature.*

The light from an LED also stops instantly when the power is turned off. However, just as it takes a period of time for traditional lamps to turn on, it also takes a period of time for them to fully turn off or cool down. During this cool down time there is a slight glow, which can affect the quality of sample measurements. Turning a lamp back on during this cool down period has negative long-term effects on the lamp. In traditional lamp applications requiring quick measurements, shutters are used to create an instant on/off light cycle or a Xenon flash lamp is used.

LEDS REACH FULL BRIGHTNESS IN UNDER A MICROSECOND WHILE UV LAMPS CAN TAKE A FEW SECONDS TO A PERIOD OF MINUTES TO REACH STABLE LIGHT OUTPUT.

Xenon Flash Lamps versus LEDs

Xenon flash lamps offer an instant on/off solution for applications, however there are drawbacks using these light sources in some instruments. These lamps have a broad spectrum, complicated drive electronics and emit front-side heat. These factors contribute to more expensive system costs because of filters and power supply requirements.

LEDs offer a more cost effective, instant on/off solution without front-side heat for instruments that require only a single parameter measurement or for measurement of heat sensitive samples. LEDs also offer better light stability than xenon flash lamps for measurements over longer time periods.

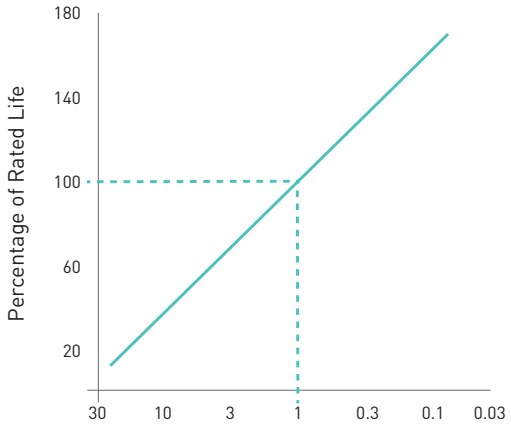
Application Benefits of Instant On/Off

Instantaneous on/off cycles benefit instrumentation applications that require light source modulation—rapid light on/off—or pulse modes. The rapid on/off cycles of LEDs allow more measurements to be taken in a shorter amount of time—increasing overall lab productivity. Time resolved fluorescence microscopy requires quick, pulsed measurements for accuracy. While shutters can be used for lamps, they add to overall cost of the instrument and system noise.

Systems used for periodic measurements require intermittent use of light sources and benefit from the instant on/off nature of LEDs. Instruments using UV lamps are typically left on for extended periods of time, even when measurements are not being taken, to avoid the required warm up and cool down periods. This impacts energy usage and lamp operating lifetime. With instruments using LEDs, the light source is available immediately, and used only when required.

On/Off Cycles and Mercury Lamp Lifetime

Traditional UV lamps (other than xenon flash lamps) are switched on and off only when needed, not only due to the lamp warm up time but also due to the impact of switching on lamp lifetime. The figure below illustrates the reduction in lifetime of a mercury lamp due to on/off cycles. Because LEDs are solid state devices, frequency or number of on/off cycles do not affect the lifetime of the device.



The emphasis on productivity and reducing costs continues to be an emphasis for emerging instrumentation applications. As design engineers look to solve these challenges, the instant on/off capabilities of LEDs will continue to make them attractive alternatives for spectroscopic applications.

We invite you to learn more about our UVC LEDs.

Crystal IS™
High Performance UVC LEDs

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