

Ultra Violet: 365 nm or 395 nm LED Lights

When to use 395 nm or 365 nm?

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UV wavelengths are used to excite a material that fluoresces under inspection. The material fluoresces by absorbing Ultra-Violet (UV) wavelengths and emitting light somewhere in the visible spectrum. Many manufacturers of UV fluorescence emission material will put a recommended wavelength of 365nm. Looking closer at the manufacturer's fluorescence graphs for excitation, 365nm is usually close to the peak. In table 1 below, over 2/3's of the absorption range is available from 325nm to 400nm. Using 395nm LED's will put the absorption at approximately 75% optical density. 395nm has a high absorption rate even though the manufacturer has a recommended a wavelength of 365nm. Other manufacturers of fluorescence materials have absorption ranges where 395nm is closer to the peak wavelength for highest optical density.

Smart Vision Lights recommends testing the application with 365nm and 395nm LED's with filters. Our testing has shown that majority of the applications in machine vision can use 395nm wavelength. The key to using UV lighting is to match the right filtering and not so much the wavelength of the UV LED light.

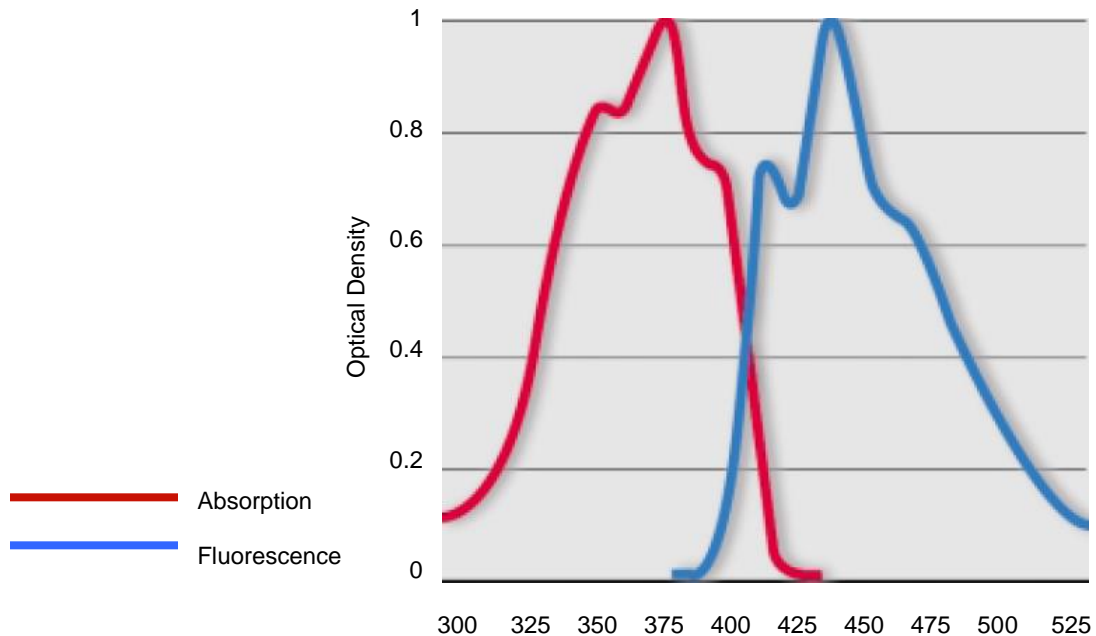
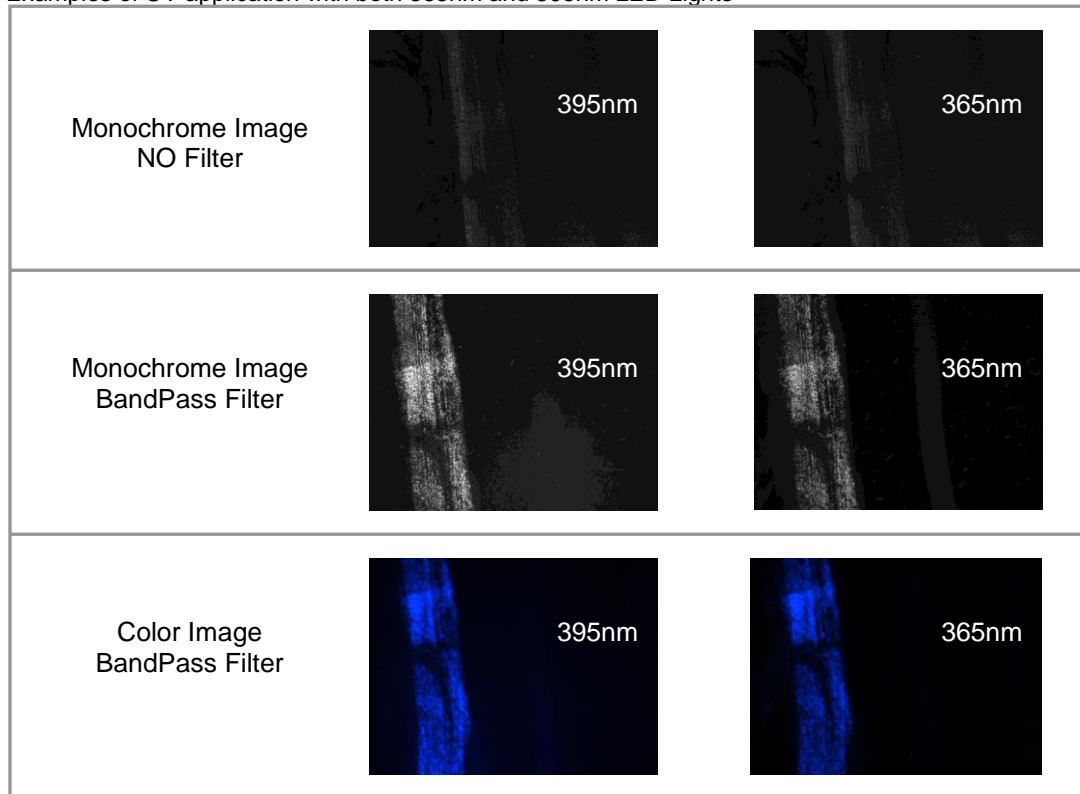


Table 1 – Absorption vs. Fluorescence

When reviewing UV LED lights in Machine Vision applications, here are a few options you need to consider;

1. Never go with the assumption that 395nm does not work and 365nm will work. It can be unnecessary to use 365nm LED light when 395nm LED light will work.
2. Smart Vision Lights has tested hundreds of UV applications with UV LED lights. 95% of the applications out there will work with 395nm LED's. We have found that in most cases 395nm does an equal or slightly better job at fluorescing than 365nm LED's.
3. UV 365nm LED's are up to ten times more expensive than 395nm LED's and in very limited supply. By using a 395nm LED light and applying the correct lens filter to the camera, an economical and a more readily available solution can be supplied.

Examples of UV application with both 365nm and 395nm LED Lights



Even when using a color camera and applying filters there is little difference in the images above between a 365nm and 395nm LED light.

Using Short Pass, Band Pass or UV Blocking Filters

The desired result is to brighten or darken (depending on a light or dark background) the visible luminescent emission and block the UV light and unwanted visible light. This will limit the unwanted wavelengths in the image and increase the desired color or wavelength. Midwest Optical Systems www.machinevisionfilters.com is an excellent source for expertise with filtering in vision applications.