

FEATURES & BENEFITS

- Mercury Free - Environmental Friendly
- Large Production Capacity
- Effective Germicidal Wavelength of 222nm
- Effective Reduction of Viruses, Bacteria and Spores
- Wide Operating Temperature
- Instantaneous On/Off at Full Output Power
- No Lifetime Reduction by Frequent On/Off Cycles
- Proprietary Safety Filter Available to Ensure Narrowband 222nm Emission

APPLICATIONS

- Surface
- Air
- Water

About USHIO

About 130 years have passed since Edison invented the incandescent light bulb. The world has seen many advancements in lighting, but there are still many more possibilities for the application of light in areas where it is not presently used. Unraveling the mysteries of light one step at a time, Ushio implements its new discoveries to provide solutions in a wide variety of cutting-edge applications, such as semiconductors, liquid crystal displays, cinema, medicine and biotechnology.

Today, Ushio is drawing attention to cutting-edge technologies as a potential means for enhancing our health and environment. These technologies will form an essential part of our future, and will contribute to improvements in the environment, food production, space exploration and the development of new energy sources.

References:

¹ Buonanno, Manuela; Ponnaiya, Brian; Welch, David; Stanislaukas, Milda; Randers-Pehrson, Gerhard; Smilenov, Lubomir; Lowy, Franklin D.; Owens, David M.; Brenner, David J.. Germicidal Efficacy and Mammalian Skin Safety of 222nm UV Light. Radiation Research. 2017 April; 187(4): 483-491.

² Ushio Inc. Internal Data

³ Kolozsvári, Lajos; Nógrádi, Antal; Hopp, Béla; Bor, Zsolt. UV Absorbance of the Human Cornea in the 240- to 400-nm Range. Investigative Ophthalmology & Visual Science July 2002, Vol.43, 2165-2168.

USHIO

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BRINGS NEW LIGHT TO LIFE



EXCIMER LAMPS
FAR UV-C

USHIO

222nm Excimer Lamps

Mercury Free • Instant Start



Comparison	222nm	254nm	280nm	405nm
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Advantages of 222nm Light

Unoccupied Spaces

222nm	254nm	280nm	405nm
•••	•	•	•••

The 222nm lamps can be safely used in unoccupied spaces.

Occupied Spaces

222nm	254nm	280nm	405nm
•••	X	X	—

The filtered Care222 lamps can be safely used not only in unoccupied spaces but also in occupied spaces without posing a health risk to humans when used within the current exposure limits recommended by the American Conference of Governmental Industrial Hygienists (ACGIH®) or the requirements of IEC 62471. Exposure within the current ACGIH recommendations and IEC requirements allow microbial reductions using 222nm far-UVC light sources in occupied spaces. Recent studies indicate that higher doses of filtered UV light emitted from the Care222nm lamps pose a minimal health risk to human skin or eyes.

Bacteria Reduction

222nm	254nm	280nm	405nm
•••	•••	•••	•

Studies show 222nm is more effective than conventional UV sources at certain types of bacteria reduction. Please ask for our white paper on the comparison.

Spore Reduction

222nm	254nm	280nm	405nm
•••	•••	••	—

Studies show that 222nm light is more effective at reducing most spores than 254nm light.

Prevent Regrowth

222nm	254nm	280nm	405nm
•••	•	•	•

The regrowth of bacteria is a major factor in maintaining a clean environment. Initial studies of 222nm vs. conventional mercury lamps show that 222nm is more effective at reducing microbial regrowth than 254nm.

Advantages of Care222

Instant On/Off

222nm	254nm	280nm	405nm
•••	•	•••	•••

Features of the Care222 lamp allows customers to obtain 100% light output in less than a second, whereas the 254nm lamp starts at only 50% output and takes several minutes to achieve 100% output. This is ideal for bathrooms, toilets, counter tops, and other occasional use applications.

Environmentally Friendly

222nm	254nm	280nm	405nm
•••	•	•••	•••

No mercury means no environmental issues with disposal of the lamp as well as no safety risk if the lamp breaks. Mercury usage and disposal laws will make conventional UV lamps obsolete in the coming years.

Temperature

222nm	254nm	280nm	405nm
•••	•	•	••

The 254nm lamps are sensitive to their environment. Temperatures colder than 20°C (68°F) and above 50°C (122°F) will significantly affect the UV output and the microbial reduction capability of 254nm lamps. The Care222 lamps have an operating range of below 0°C (32°F) to over 100°C (212°F) without affecting the output or microbial reduction capability of the lamps. The Care222 lamps are ideal for indoor or outdoor applications.

Cost

222nm	254nm	280nm	405nm
•	•••	•	•••

The Care222 solution may cost more than conventional mercury lamps, but its mercury-free microbial reduction properties, instant on/off, smaller size, and environmental friendliness more than offset the cost difference for most applications.

Strength Level: ••• Very Strong •• Strong • Weak

UV-C Comparison Studies

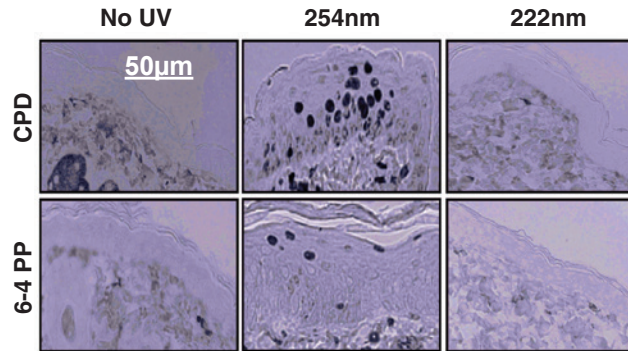


Fig. 1 Comparison of cross-sectional images of UVC-induced premutagenic skin lesions CPD (cyclobutane pyrimidine dimers) and 6-4PP (photoproducts) in the dorsal epidermis of mice. A UV dose of 157 mJ/cm² was used for both 254 and 222 nm¹.

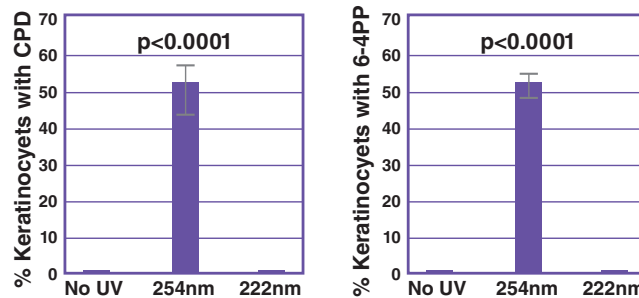
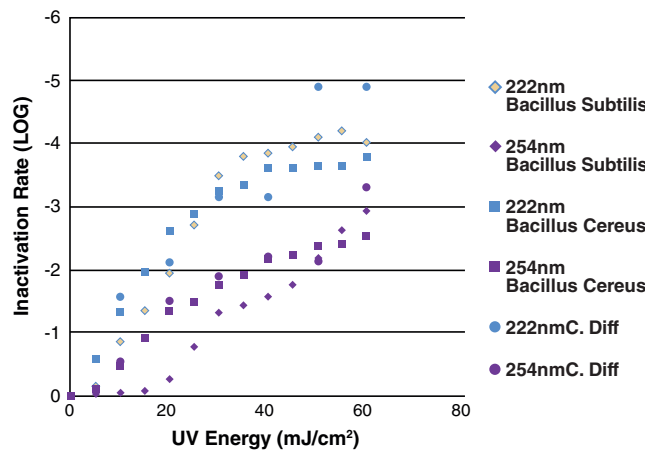
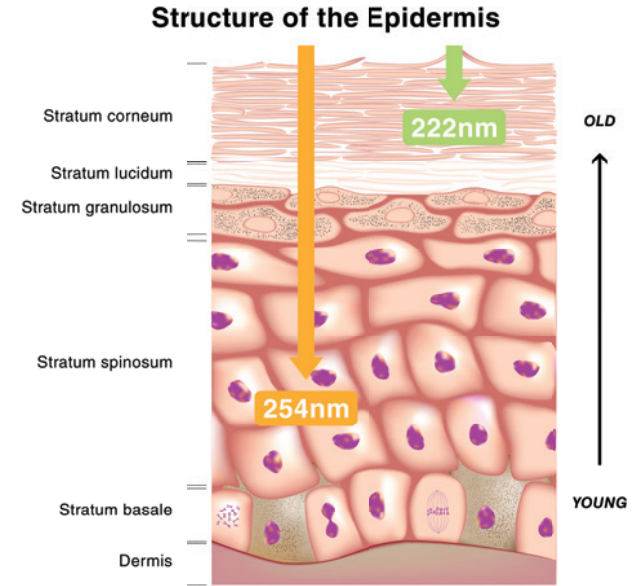


Fig. 2 & 3 Average percent of keratinocyte cells exhibiting dimers (Fig 2. - right CPD; Fig 3. - left 6-4PP) measured in UVC-induced premutagenic DNA lesions in nine randomly selected fields of view per mouse (n=3)¹.

Fig. 4 Comparison (254nm vs. 222nm) for Spore Inactivation²

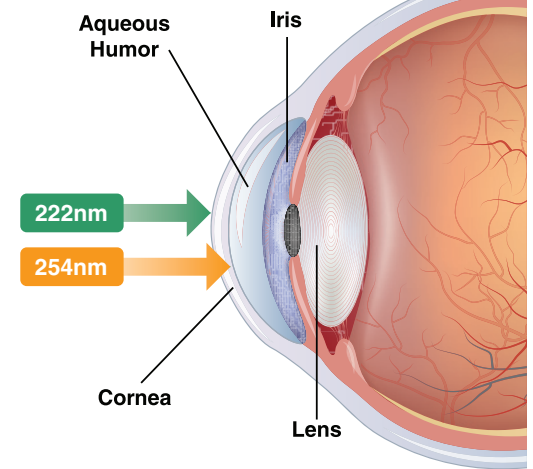


Skin Absorption Showing 222nm vs. 254nm



Light at 222nm wavelength is absorbed by dead skin cells

Damage of Cornea



Light at 222nm wavelength is absorbed in the outer surface of the cornea and is much less likely to cause cataracts.³

All safety testing was done with Ushio's proprietary filter technology to provide only narrowband 222nm light emission.