

## FEATURES & BENEFITS

- Mercury Free
- Large Production Capacity
- Flexible Design Capabilities for Custom Lamp Development
- Effective Germicidal Wavelength
- Effective Spore Reduction
- Wide Operating Temperature
- Instantaneous On/Off

## 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:

<sup>1</sup> 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.

<sup>2</sup> Ushio Inc. Internal Data

<sup>3</sup> 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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# Care

222™

BRINGS NEW  
LIGHT TO LIFE



EXCIMER LAMPS  
FAR UV-C

# USHIO

# Care222 Excimer Lamps

Mercury Free • Instant Start



Comparison                      222nm    254nm    280nm

## Unoccupied Spaces

Care222 is presently used for unoccupied spaces, but initial studies are showing that large doses of 222nm pose no potential health risks to the skin or eyes. Studies are ongoing to make Care222 the future solution for all occupied and unoccupied microbial reduction solutions.

## Bacteria Eradication

Studies show Care222 is more effective than conventional UV sources at certain types of bacteria eradication. Please ask for our white paper on the comparison.

## Spore Eradication

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

## Prevent Regrowth

The regrowth of bacteria is a major factor in maintaining a clean environment. Initial studies of Care222 vs. conventional mercury lamps show that Care222 is more effective at significantly reducing microbials than 254nm.

## Instant On/Off

Features of the Care222 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

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

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. Care222 has 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. Care222 is ideal for indoor or outdoor applications.

## High Power Density

Able to fit 300W of 222nm energy in less than a 500mm footprint, allowing for quick treatment and smaller fixture designs than the conventional 254nm lamps that can only fit 80W in the same foot print.

## Cost

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 offsets the cost difference for most applications.

Strength Level: ●●● Very Strong    ●● Strong    ● Weak

## UV-C Comparison Studies

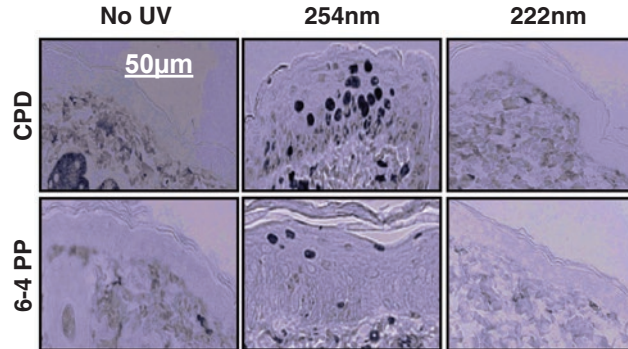


Fig. 1 Comparison of cross-sectional images of UVC-induced premutagenic skin lesions CPD (cyclobutane pyrimidine dimers) and 6-4PP (photoproducts) in the dorsal epidermis of mice. A UV dose of 157 mJ/cm<sup>2</sup> was used for both 254 and 222 nm<sup>1</sup>.

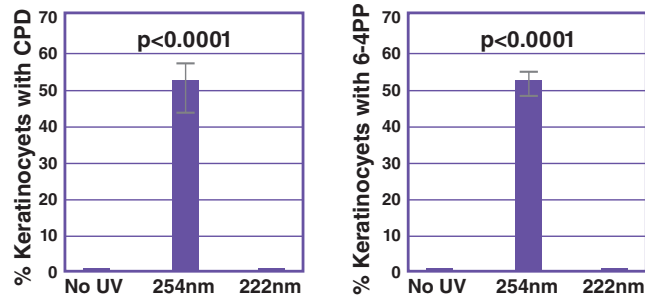
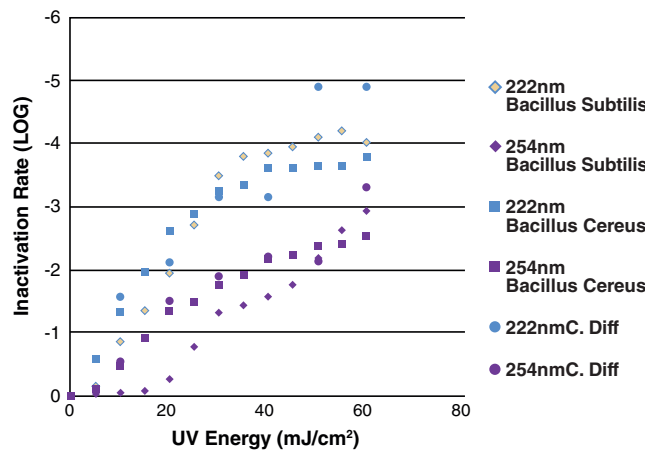
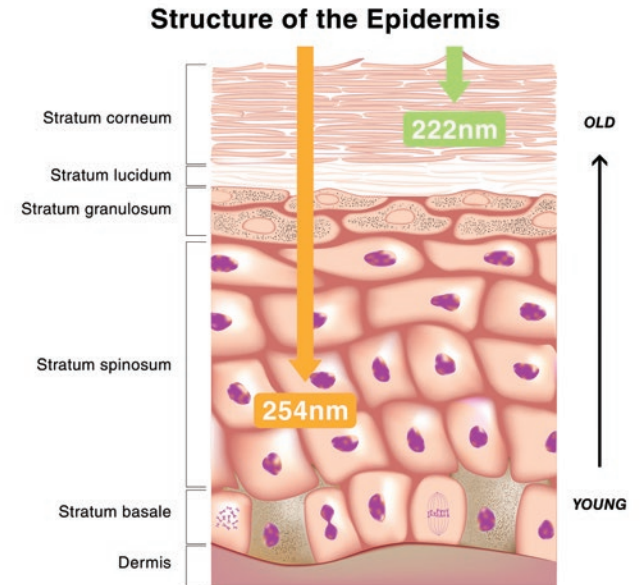


Fig. 2 & 3 Average percent of keratinocyte cells exhibiting dimers (Fig 2. - right CPD; Fig 3. - left 6-4PP) measured in UVC-induced premutagenic DNA lesions in nine randomly selected fields of view per mouse (n=3)<sup>1</sup>.

## Fig. 4 Comparison (254nm VS 222nm) for Spore Inactivation<sup>2</sup>

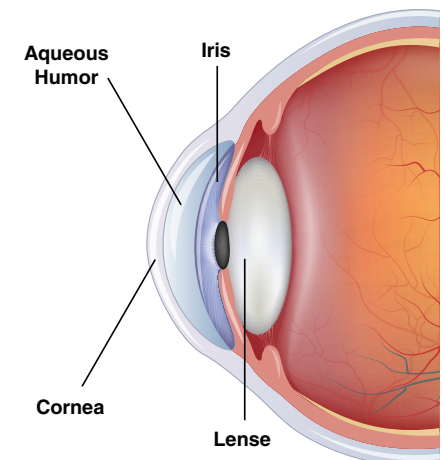


## Skin Absorption Penetration Showing 222nm vs. 254nm



222nm light is absorbed by dead skin cells

## Damage of Cornea



Corneas absorb 222nm and does not produce cataracts.

The transmittance of cornea at 280nm or shorter wavelength is 0.01% or less.<sup>3</sup>