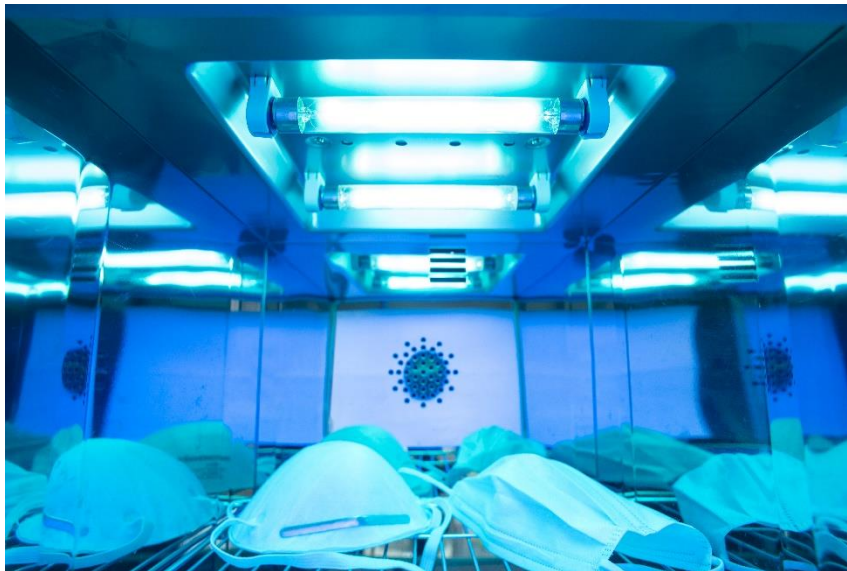


Health and Sanitization through UV Lighting

How do you go about determining the light levels and exposures needed to sufficiently sanitize a surface?

With the SARS-CoV-2 pandemic, a strong demand for UV disinfecting lamps has developed. UV light, especially the UVC region from 255nm to 265nm, has been shown to render viruses noninfectious by [destroying their genetic material](#), DNA and RNA. In general, a [dosage of 20 to 100 mJ/cm² of UVC light](#) is



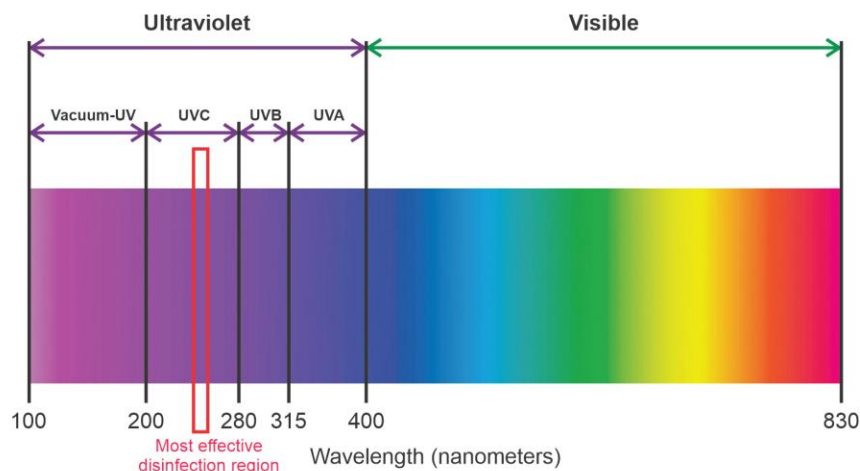
usually sufficient to destroy most bacteria and viruses, including coronaviruses like SARS-CoV-2. How do you go about determining the light levels and exposures needed to sufficiently sanitize a surface? Instrumentation from [Gamma Scientific](#) will provide you with the information on the irradiance and radiant exposure values you need.

What is Irradiance and Radiant Exposure?

Irradiance is the amount of flux per unit area of radiant power falling onto a surface. In simple terms, it is the amount of light hitting an object, expressed in units of Watts per unit area. The SI (International System of Units) unit of irradiance is Watts per square meter (W/m²), but for different applications it can be expressed in microWatts per square centimeter (μW/cm²) or milliWatts per square centimeter (mW/cm²).

Radiant Exposure is similar to irradiance in that it is the amount of flux per unit area of radiant power falling onto a surface but cumulated **over time**. It is expressed in units of Joules per unit area. The SI unit is Joules per square meter (J/m²), which can similarly be reported as μJ/cm² or

mJ/cm². A Watt is a Joule per second, so multiplying an irradiance value by the number of seconds will give you the radiant exposure. (W/m²) * seconds = J/m².



Both the irradiance (and therefore radiant exposure) will decrease the farther away you are from the light source. For most unfocused light sources, once you get beyond a distance 10 times the largest dimension of the light source, the change in irradiance will follow what is known as the inverse square law. That law states that the intensity of light will drop off as the square of the distance. This means for a given distance, if you double that distance, the irradiance will decrease by a factor of 4 (2²). Therefore, when determining the proper radiant exposure levels needed, the intensity of light, the distance away from the object that light is, and the amount of time the light hits the object are all factors.

Measurement Tools

Gamma Scientific offers several products to perform both irradiance and radiant exposure measurements. We start with the model [268UVC sensor](#). Measuring 37mm in diameter and just 12.2mm tall, this is a low-profile sensor optimized for measurements in the UVC region of the spectrum. It is capable of measuring irradiance levels ranging from 0.05 µW/cm² to 500 mW/cm², giving it plenty of dynamic range to measure most UVC lamps.

The 268UVC sensor then gets coupled to one of Gamma Scientific's [optical power and energy meters](#). There are both handheld and benchtop, single and multi-channel instruments to choose from. The model [S450 is a single-channel](#), battery powered, handheld power and energy meter. The [S400 series benchtop power and energy meters](#) include the models S470, S480, S485, and S490, which are 1-channel, 2-channel, 3-channel, and 4-channel meters, respectively.

All the instruments listed above can be used either to measure the irradiance of your lamp, or the radiant exposure of your lamp. Put the meter in power mode and you will obtain an instantaneous reading of the irradiance. Put the meter in energy mode and read the radiant exposure over time. All devices are intuitive and quite simple to operate. They also all have computer interfaces for remote operation and data logging.



Accredited Calibration

Gamma Scientific's world-class laboratory is accredited to [ISO/IEC 17025 standards by NVLAP \(Lab Code 200823-0\)](#). This ensures the measurements you make with the instruments are highly accurate and give you high confidence in the reported values.

Safety Precautions

The UVC wavelengths are high energy and will damage human tissues. For all the reasons UVC light destroys viral RNA and DNA, it will also destroy human DNA. When working with UV light sources, please ensure your skin and eyes are protected and prevent direct exposure to the radiation. Ideally, these light sources are only operated in unoccupied spaces out of sight.