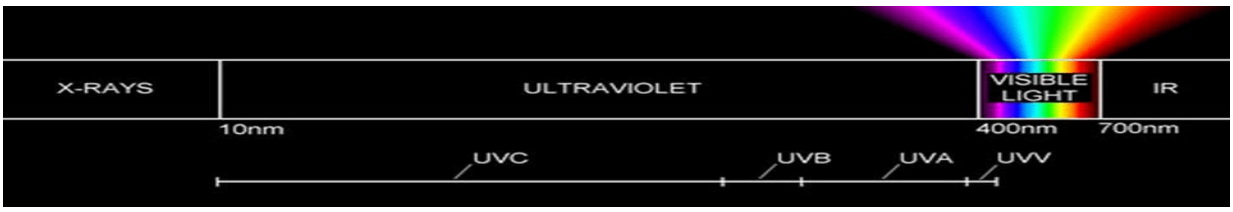
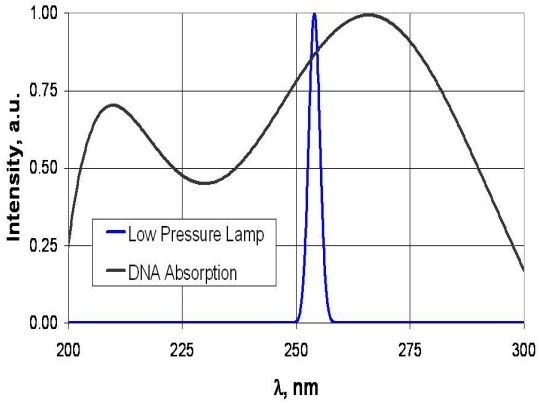
Advantages of Intense Pulsed UV Sterilization:

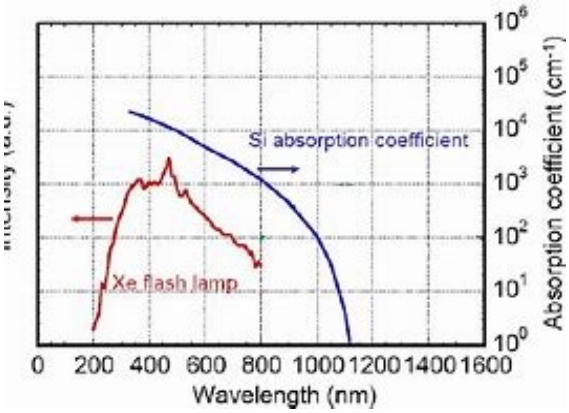


Ultraviolet (UV) belongs to the electromagnetic waves with wavelengths below the darkest visible violet region (<400 nm, >3 eV). Widely used low pressure Mercury vapor filled UVC lamps continuously (actually as a 50 ot 60Hz sin-wave) emit its major light in to 254nm line-up to ca. 30% of all emitted light. This line fits the maximum of the DNA absorption and by that deactivates micro-organisms.

The power of such lamps usually do not exceed 1w/cm of the lamp length and a rather long exposure to this light is required to reach a necessary UVC does in j/cm². The latter is a product of the power in watts/cm² (J/cm² x sec) and the exposure time. Such "germicidal" UVC lamp reach up to 200cm in length to cover larger areas.

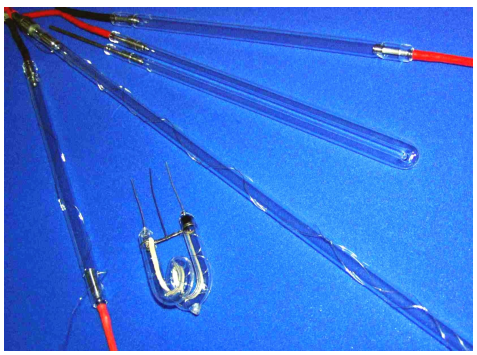
By contrast the pulsed UV light operated with rather short impulse lamps (UV flash lamps) wish emitts hundreds times as much germicidal power per cm² just during one pulse. It spectra fills almost all absorption spectral capability of microorganisms DNA.

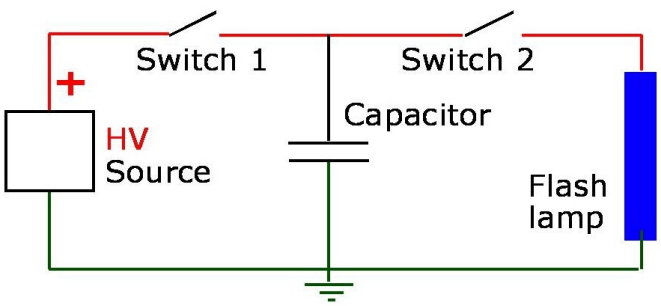




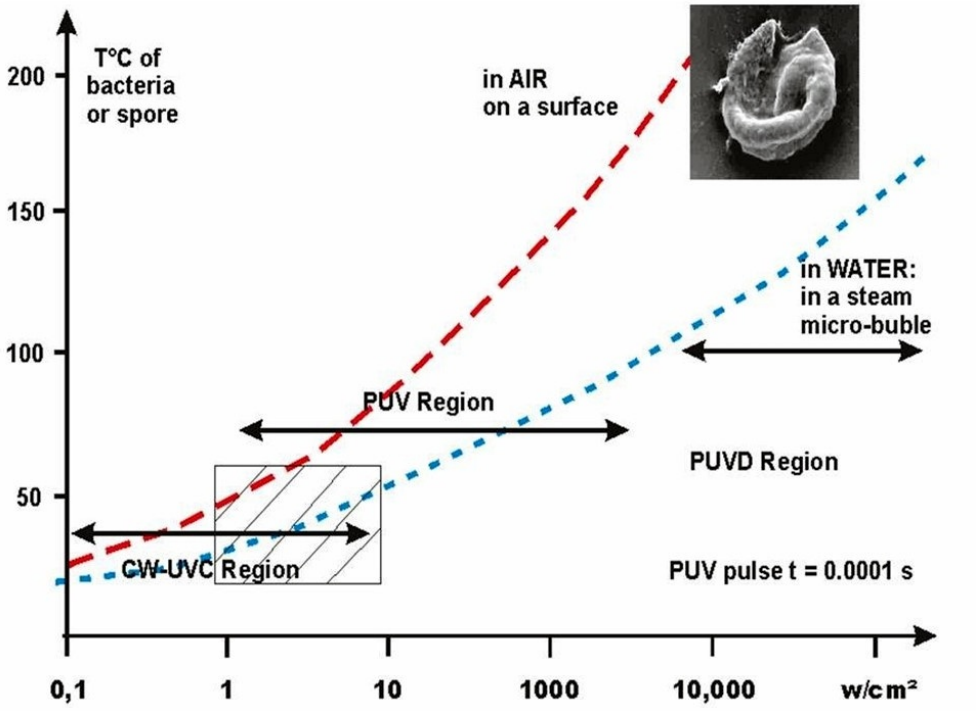
Flash lamps usually have length from ca. 10cm to 50cm, plus have also spiral or an arch and emit hundreds times as much in germicidal power as to compare to low pressure continuous wave UV (CWUV) lamps. It has strong advanatges for a number of applications where very hight degree sterilization is required (up to 6 logs, or ABSOLUTE) sterilization including UV and thermal resistant spores!

This is reached by first accumulating the electrical energy in a capacitors and then fast discharging it ain to flash lamp creating 10 to 20 thousand grad Xenon plasma for just one or a few hundred micro-seconds. The lamp spe tra shuif to deper UV light with the increase of the pulse current density (Amps/cm²) yet it also decreases the lamp life. Many factors have to be taken in to account to select a cost-effective sterilization process with pulsed UV.





As Dr. Alex Wekhof found in 1999 and reported in his and later also with his and cor-authors publications, only the specific UV power deposition on samples in J/cm²sec defines the effectiveness of UV pulses affects sterilization. It is on the chart below:



As it follows from the above cart, at the PUVD region all UV spectra contribute to the spores / bacteria very fast overheating and its respective disintegration. It must go faster than spores cooling in to its surrounding ,media. BY contract, flash lamps work in the CW-UVC region does not have any advantage over standard continuously emitting 254nm lamps.

Therefore each new case has to be evaluated using also our PUV R&D system or by constructing a pilot system for your needs.

See details in "Our Publications: *Alex Wekhof, PDA J. of Pharmaceutical Sci. & Techn. May 2000:* and then experimentally proved by a joing work with Fraunhofer (Aachen Freizing), published at *Report to the 1-st IUVA Congress, 2001, USA, posted in* our INFO.

Summary: benefits of intense pulsed UV light (PL) sterilization:

- a few intense UV pulses can fully sterilize the surface under the lamp or a liquid,
- *effective to UV and thermal resistant spores - both disintegrate equally fast,*
- no heat or structural damagies to the product - it is non-invasive sterilization,
- *low operating costs per sterilized item (volume and wight),*
- can sterilize through UV clear plastic and in some cases through a thin glass vials,
- *safe, no Mercury in -only Xenon gas, the instant action, no warm-ups,*
- FDA approved /recommended and requires no labelling.

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