# Opportunities and risks of UV-C disinfection

László Balázs and József Nádas,

*Institute of Microelectronics and Technology, Kandó Kálmán Faculty of Electrical Engineering, Óbuda University, Budapest, Hungary*

Since the breakout of covid-19 pandemic there has been a growing interest in fast and cheap disinfection methods. UVC radiation has been known as an effective means of disinfection for decades[1]. UVC radiation can effectively destroy viruses, bacteria and fungi as shown in Fig 1 reproduced from ref. [1]. Actions curves exhibit a peak at about 260 nm which is close to the emission peak of low-pressure mercury discharge. The germicidal effect is due to the absorption of UV radiation by nuclear acids. Germicidal lamps emitting 254 nm radiation has been widely used in hospitals to disinfect air and surfaces. Industrial scale low pressure mercury discharge light sources are used in water treatment and purification. The disadvantage of UVC radiation is that direct exposure of human eye or skin to UV light is associated with significant health risks. The eye is particularly sensitive to UV wavelengths at around 280 nm where the maximum absorption of cornea occurs. A few seconds exposure to UVC light can result in photokeratitis and conjunctivitis. Regulations also limit UVC exposure to human skin. A UV radiation may cause skin burns in a few minutes and prolonged exposure to UV light increases the risk of skin cancer. Using UVC disinfection in unattended spaces may also be harmful to the environment. Surfaces made of organic materials may be damaged by extended UVC exposure. Recent publications however consider far-UVC (222 nm) radiation as potentially safe to use in occupied public locations while being effective in destroying airborne coronaviruses [2].

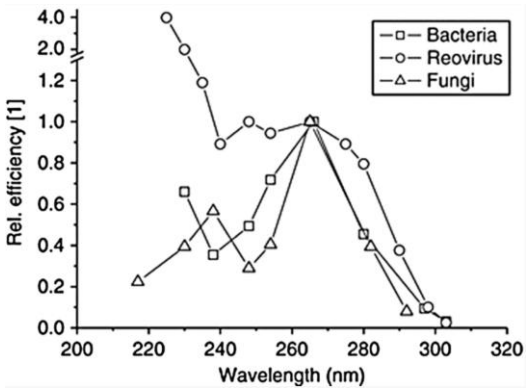


**Fig 1. Action curves showing relative efficiency of radiation to destroy bacteria Escherichia coli, reovirus-3 and fungi Trichophyton mentagrophytes [1]**

References

[1] Schmalwieser A.W., Weihs P., Schauberger G. (2018) UV Effects on Living Organisms. In: Meyers R. (eds) Encyclopedia of Sustainability Science and Technology. Springer, New York, NY. https://doi.org/10.1007/978-1-4939-2493-6_454-3

[2] Buonanno, M., Welch, D., Shuryak, I. et al. Far-UVC light (222 nm) efficiently and safely inactivates airborne human coronaviruses. Sci Rep 10, 10285 (2020). https://doi.org/10.1038/s41598-020-67211-2