MONITORING PATHOGEN DECONTAMINATION EFFICIENCY BY USING AUTOFLUORESCENCE SPECTRA

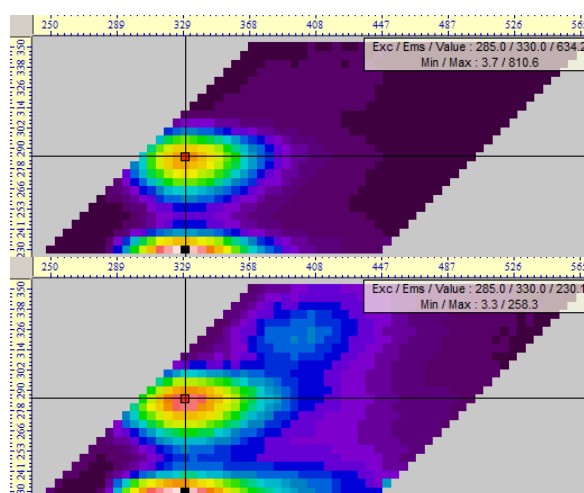O. Rebane[1,2], M. Kirm[1], S. Babichenko[2], L. Porõvkina[2], I. Sobolev[2]

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The aim of the study was to collect data to develop a prototype of photonic sensor, which enables quick estimation of microbiological pathogen surface concentrations and death ratio in indoor environment settings (e.g., in bio-laboratories, hospitals, emergency vehicles, etc.) during decontamination process without applying any marker chemicals, but only using the autofluorescence of the bacteria [1]. The living pathogens exhibit distinctly different fluorescence, compared to dead ones and this difference can be used to estimate cell death, helping to optimize the decontamination process.

Fig 1. B. atrophaeos fluorescence intensity fall-off during bleach decontamination in excitation emission matrix spectroscopy. Upper spectrum: initial spectrum just after adding bleach. Lower spectrum: spectrum after 84 minutes.

Measurements were made during different types of decontamination processes (with different agents: bleach solution, hydrogen peroxide vapors) and the change in the autofluorescence spectra was monitored online throughout the process. The prototype sensor was designed to measure the tryptophan-like fluorescence peak near 280nm excitation and 330nm emission wavelengths of bacteria and bacterial spores at close range.

References

1. Bentahir M., Babichenko S., Piette A.S., Poryvkina L., Rebane O., Smits B., Sobolev I., Soboleva N., Gala J.L. (2018). Non-contact, real-time laser-induced fluorescence detection and monitoring of microbial contaminants on solid surfaces before, during and after decontamination. Journal of Biosensor and Bioelectronics, 9 (2, 255).2155-6210.1000255.