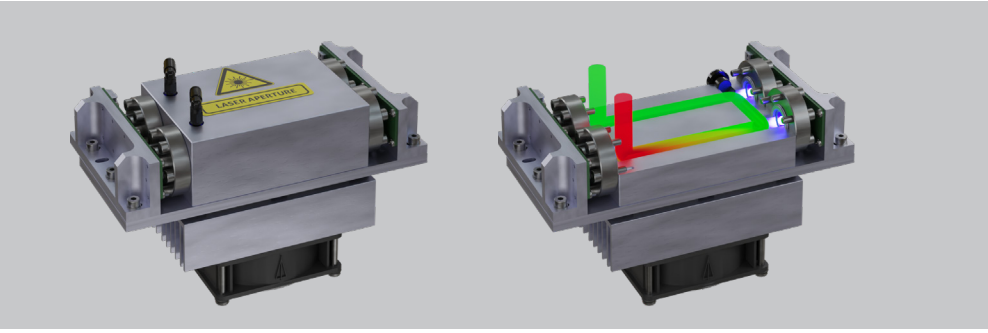
UV-C Disinfection Module
for germ-free cell sorting

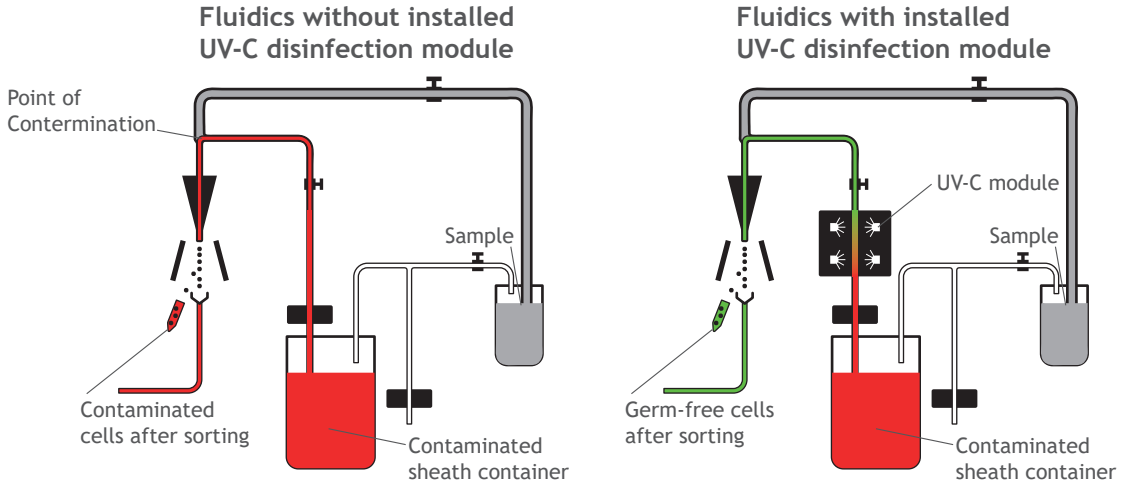
Introduction

The contamination of the sheath fluid of a cell sorter by germs inhibits the cultivation of the sorted cells. Such contamination can happen, for example, when the sheath fluid reservoir is opened for refilling or through contamination by compressed air that is required for cell sorter operation. For this reason, decontamination is usually accomplished by regular flushing the fluidics with sodium hypochlorite or ethanol. However, such cleaning procedures are time consuming and residues of cleaning reagents in the fluidics are toxic for the cells of interest.

The lethal effect of UV-C light is well known for inactivating microorganisms without the side effects of a chemical treatment. The antimicrobial effect of UV-C light is based on the absorption of photons in the wavelength range of 200 – 280 nm by the DNA, resulting in the formation of pyrimidine dimers which inhibit DNA replication and consequently block transcription to RNA. Multiple UV-C emitting LEDs combined in a flow-through reactor are very suitable for the decontamination of the sheath fluid of a cell sorter. The resulting UV-C dose of four LEDs enables the reduction of P. aeruginosa by log 5.8.



Flow-through reactor equipped with 4 UV-C LEDs



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Decontamination

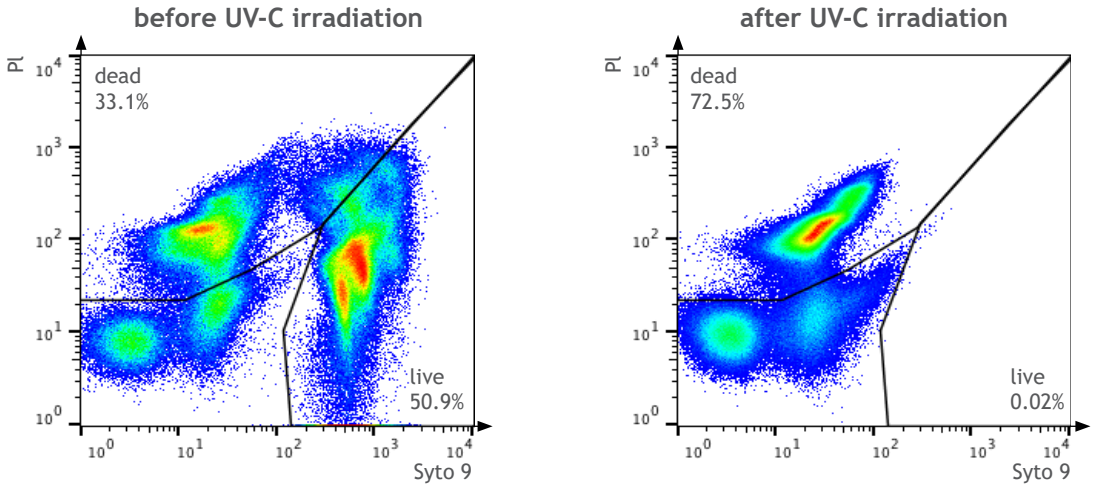
Aseptic cell sorting is the prerequisite for antibiotic-free cultivation of cells after sorting. However, the sheath fluid system of a cell sorter may be contaminated with germs such as bacteria, yeast, viruses, or fungi.

By decontaminating the sheath fluid with UV-C light using the flow-through principle, the effect of the germs on the cell culture can be prevented.

Advantages

Using flow-through irradiation with UV-C LEDs to decontaminate the sheath fluid is an easy-to-use, robust and reliable method. It allows to grow cell culture in an antibiotic-free aseptic environment after cell sorting.

Validation



Validation of the UV-C disinfection module by flow-cytometric analysis of P. aeruginosa using the DNA-intercalating dyes Syto9 and PI. Left side: untreated sample of sheath fluid contaminated with P. aeruginosa. Right side: UV-C doses of 40 J/cm² were applied to the sheath fluid.

- UV-C dose up to 40 J/cm²
- Proven 5.8 log reduction of bacteria (P. aeruginosa) in sheath fluid
- Easy integration into the fluidic system via quick connectors
- Reliable stainless steel reactor including sheath fluid cooling
- Separate power supply and temperature controller

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