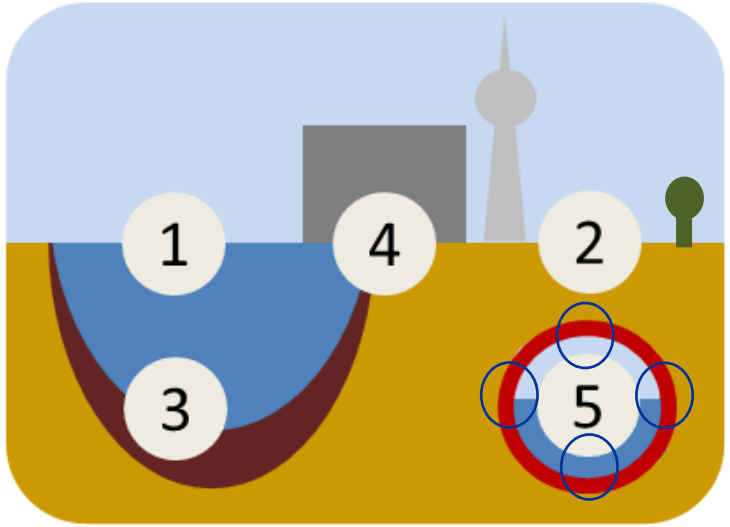
Bacterial physiology in interfaces

Adrian Augustyniak



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Research question

Antibacterial and antiviral properties of photocatalytic foams

1. Feasibility – pilot installation
2. Microbiological methods

Research methods

Fig. Setup for experiments

Further improvements

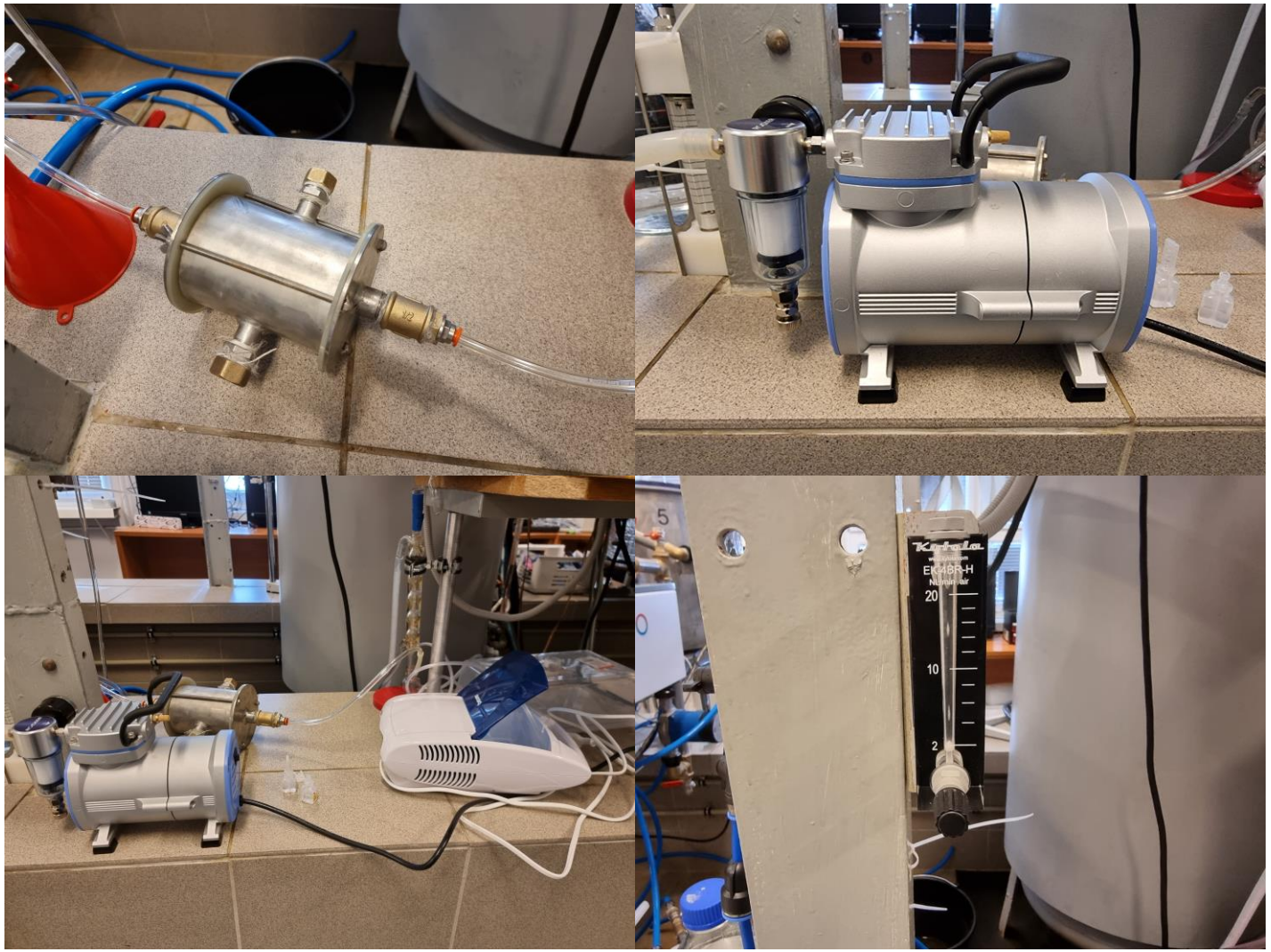


Fig. Improvements made in the experimental setup

Main results

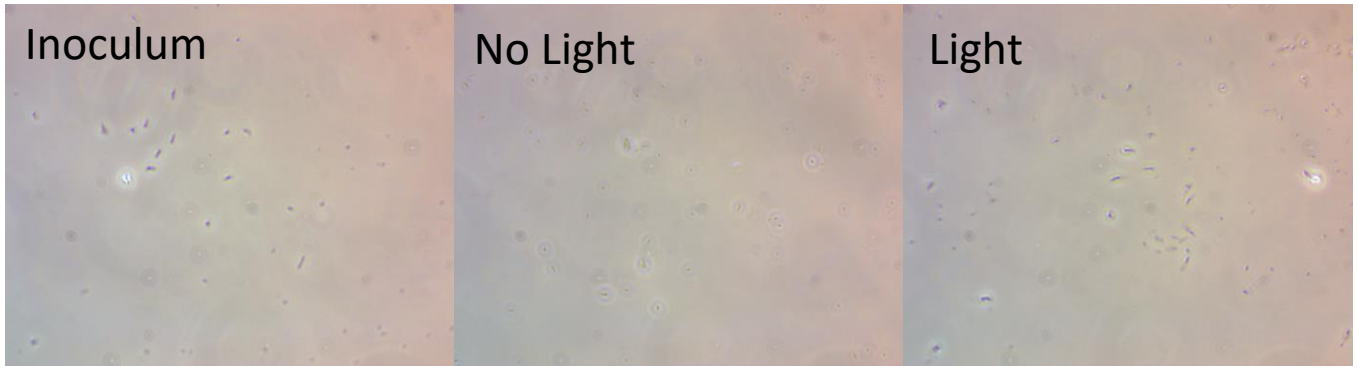


Fig. Microphotographs of cells before and after transfer through the photocatalytic foam

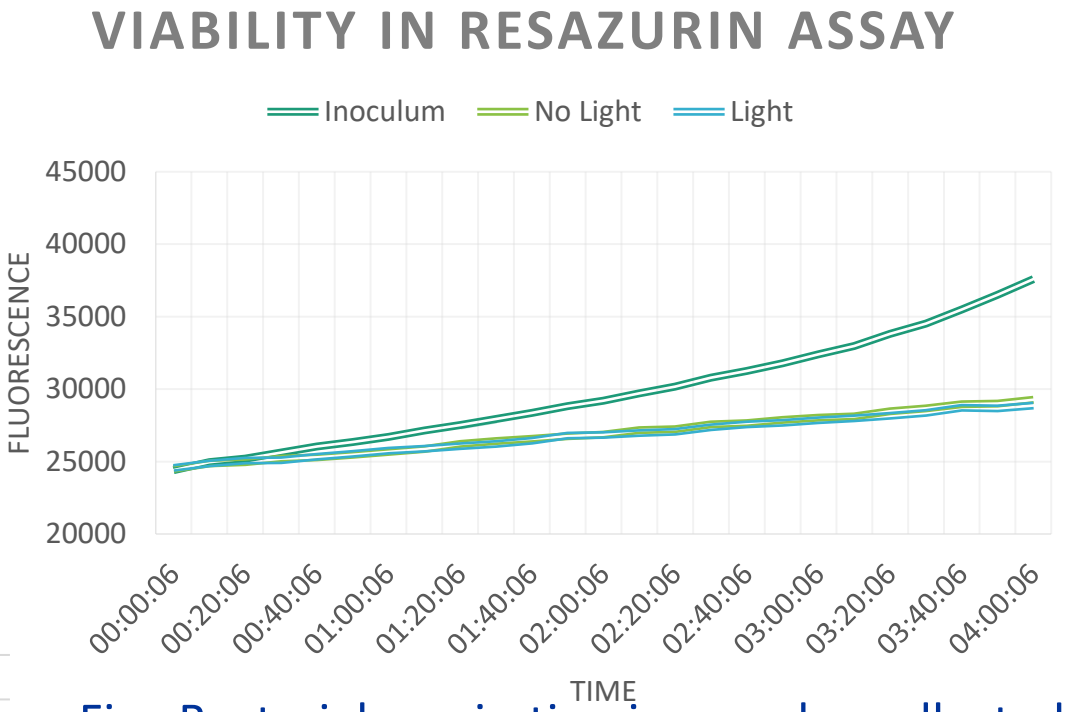


Fig. Bacterial respiration in samples collected from the experimental set

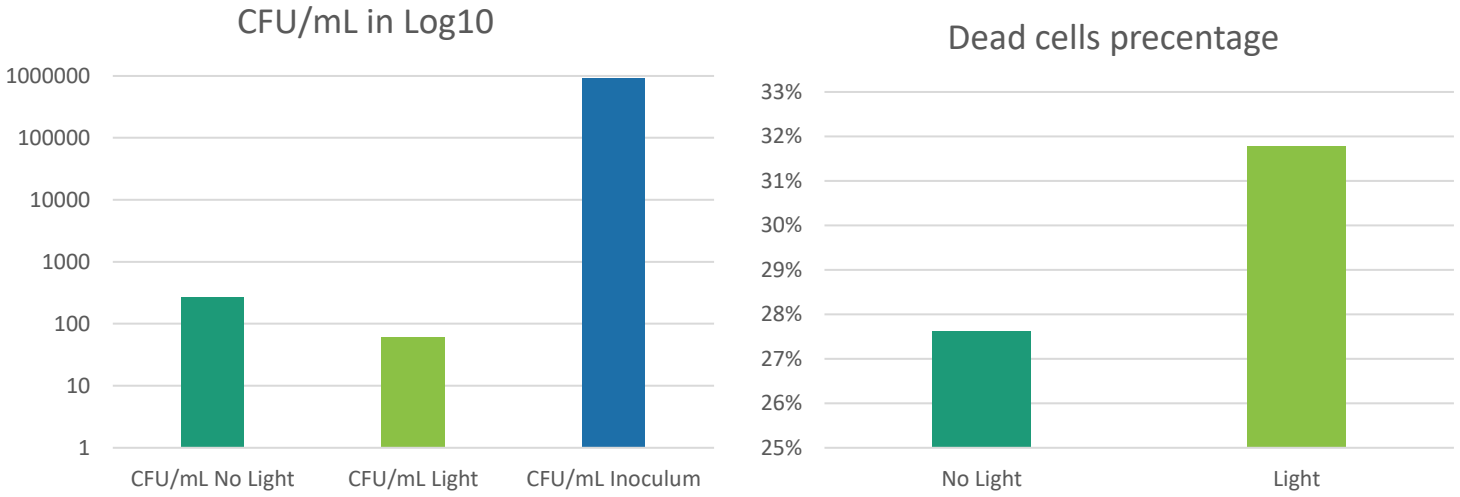


Fig. Plate counts and viability of cells after transfer through the photocatalytic foam

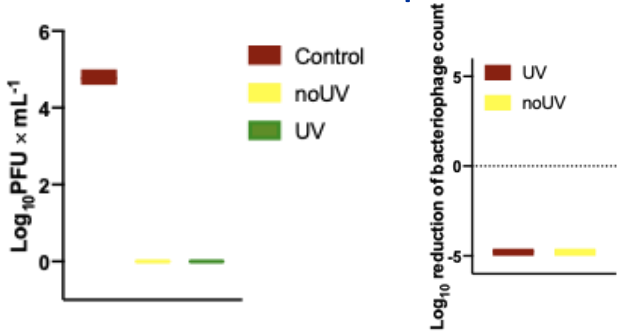
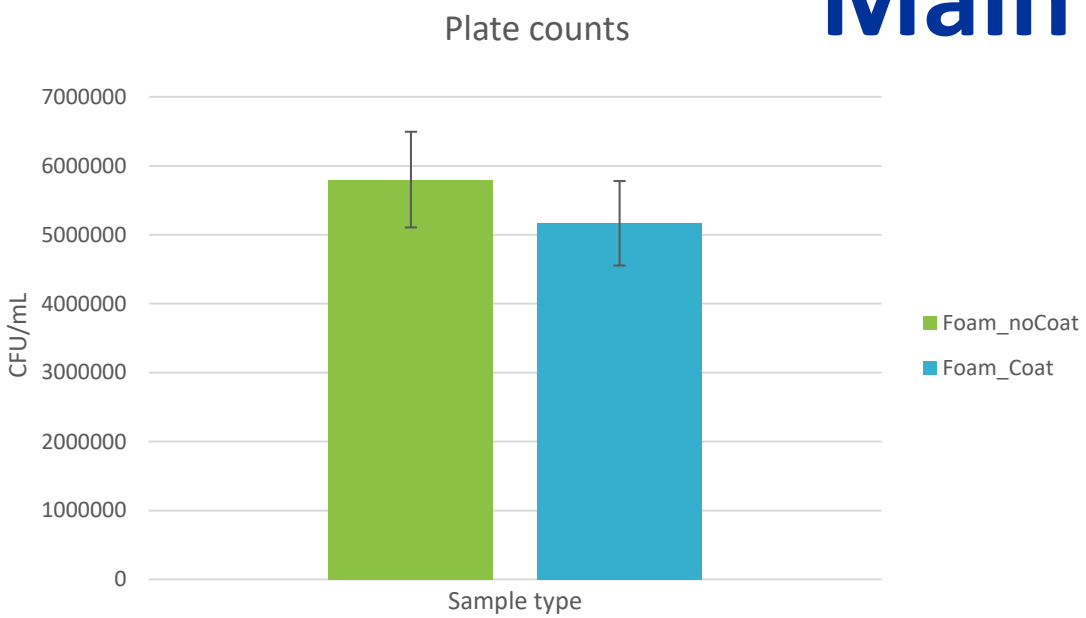


Fig. Bacteriophage counts in the samples

Main results



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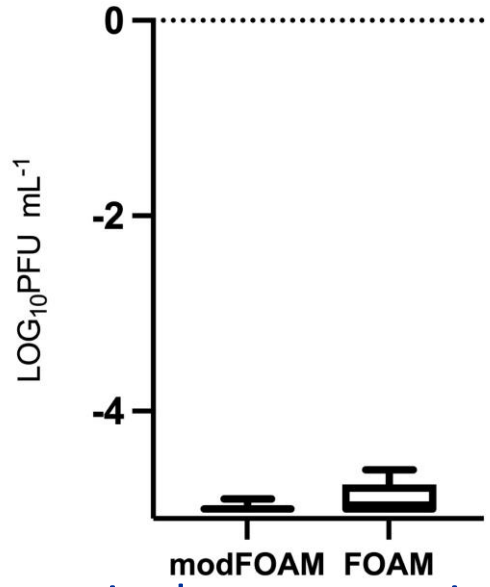

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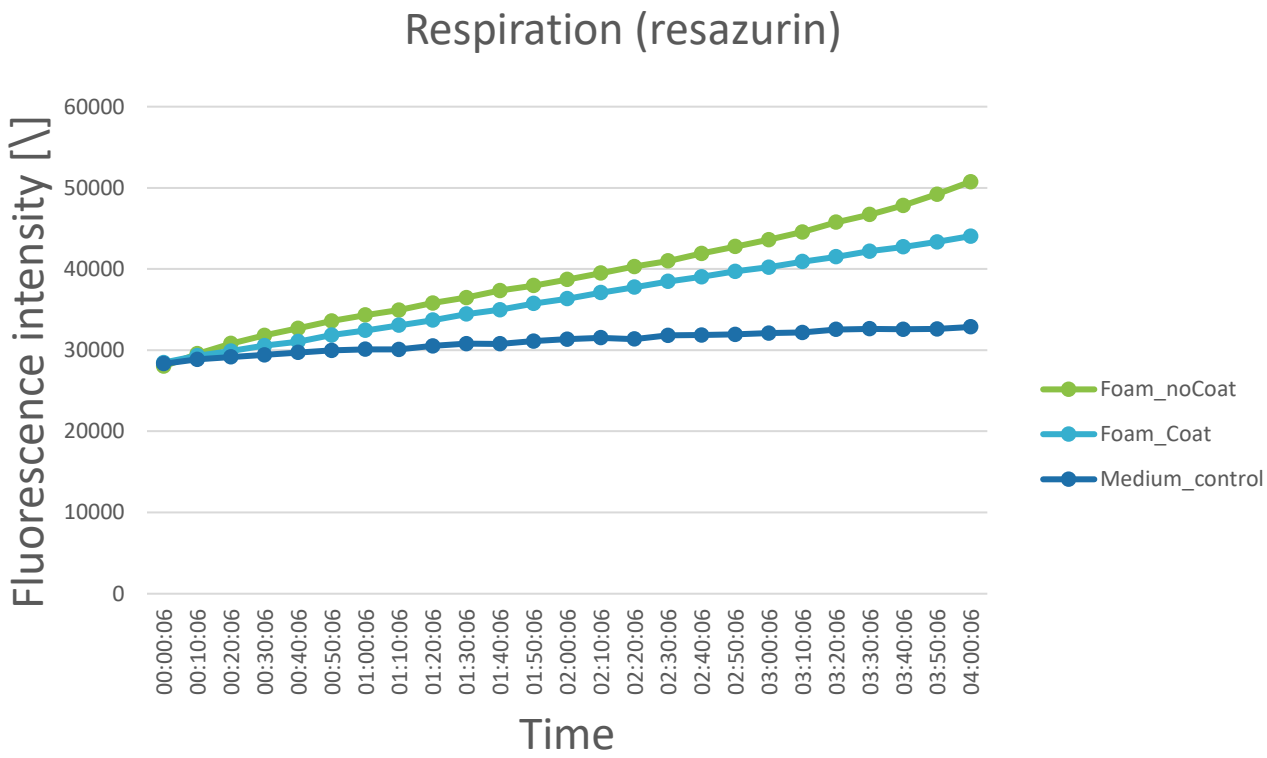

Fig. Bacterial respiration in samples collected from the experimental set

(Early) conclusions

- Complete reduction of virions could be caused by mechanical forces or the previous use of host bacteria in the system
- TiO_2 in the foam, might have caused the decrease in the bacteriophage number
- System causes a decrease in number of tested microorganisms with and without light. This is probably caused by its porosity and the velocity of air
- Potentially, the foam has a photocatalytic effect, what can be concluded from smaller number of cells that survived the transfer

Future research opportunities

- Studying variety of porous materials including foams and filters
- Performing tests on other microbiological models – environmental significance
- Developing more precise methods for nebulization and droplet transfer