

## LUMITRONIX® trainee basic experiment: „UV-C disinfection in a lunch box“

### · Question and aim:

UV-C LED radiation can be used to inactivate a wide variety of microorganisms. Our trainee has been given the task of demonstrating this effect with an experiment. A sample set-up should give insight into a possible area of application and at the same time **visualise** the effect of disinfection with UV-C LED radiation.

### · Procedure:

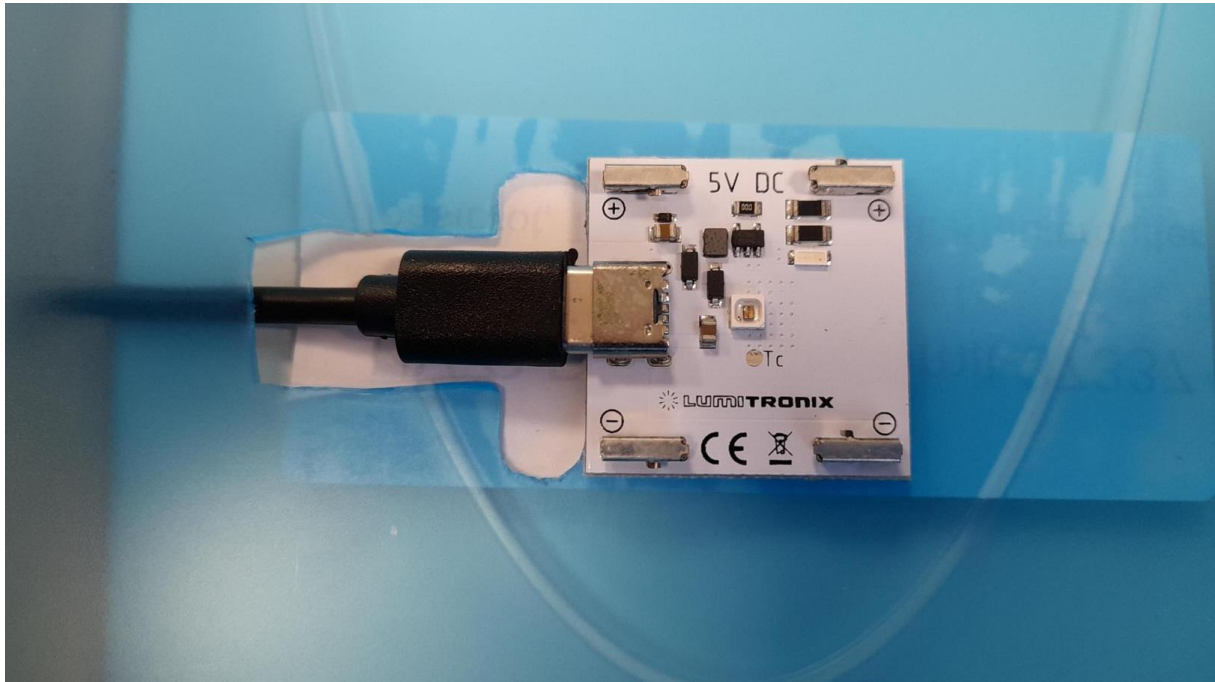
- 1) Safety instruction: Any skin and eye contact with a UV-C radiation source must be avoided.
- 2) Experimental setup: Two sandwiches with the same toppings are stored for one week at room temperature in a plastic bread tin. A UV-C LED module is installed in one of the bread boxes, which should have a germ-inhibiting effect.
- 3) Components used:
  - [UVC LED Module, USB-C, 275nm, 1 LED, 30x30mm, 5V, 3,5mW](#)
  - [Plug-in power supply](#)
  - [Cable, USB-C to USB-A, black, 1m](#)
  - Two lunch boxes and two sandwiches with the same toppings



- 4) Installation of the UVC LED module in the lid of a lunch box

The compact disinfection module is equipped with a UV-C LED with peak wavelength 275 nm and 3.5 mW radiation power. The power supply with 5 V is provided via a USB-C connection and can be operated with a power bank or another supplier.

Built into the lid of a lunch box and secured with adhesive tape, the experimental disinfection unit for the experiment is created.



The sandwich is irradiated with UV-C radiation from the module for 7 days in continuous operation. For safety reasons, the module is only switched on when the lid is closed.

For comparison, a second sandwich is packed in the same lunch box and stored without UV-C radiation at the same room temperature.

#### Result:

While the sandwich in the lunch box with the UV-C module shows no signs of spoilage, the second sandwich clearly shows mould growth in various places.





### Critical appraisal:

The experimental set-up is intended to show how easily everyday objects can be converted into devices for sterilisation as part of DIY projects.

Of course, the experimental setup is by no means ready for industrial application.

We are convinced that the visually still appealing sandwich is nevertheless no longer edible. The direct UV-C radiation in the lunch box is not suitable to reach all relevant areas. Many microorganisms (especially fungi) can be suspected in the shade formation, even if not visible to the naked eye in our example.

You can support an even distribution of UV rays in a larger box with reflective material (such as aluminium foil).

In the industry, UVA radiation is often used to disinfect areas that come into contact with food. Oxidation filters (TiO<sub>2</sub>) and small fans support the air circulation in the enclosed area so that a uniform cleaning effect can be achieved.

As a result, however, the goal of the experiment was achieved. The lunch box equipped with the UV-C module was able to visualise the germinating effect of UV-C radiation.

For further statements, laboratory tests would have to be carried out to determine exact germ quantities.

