

# Novel Use of a Targeted Ultraviolet Light Device for the Decontamination of a Single-Use Filtering Facepiece Respirator

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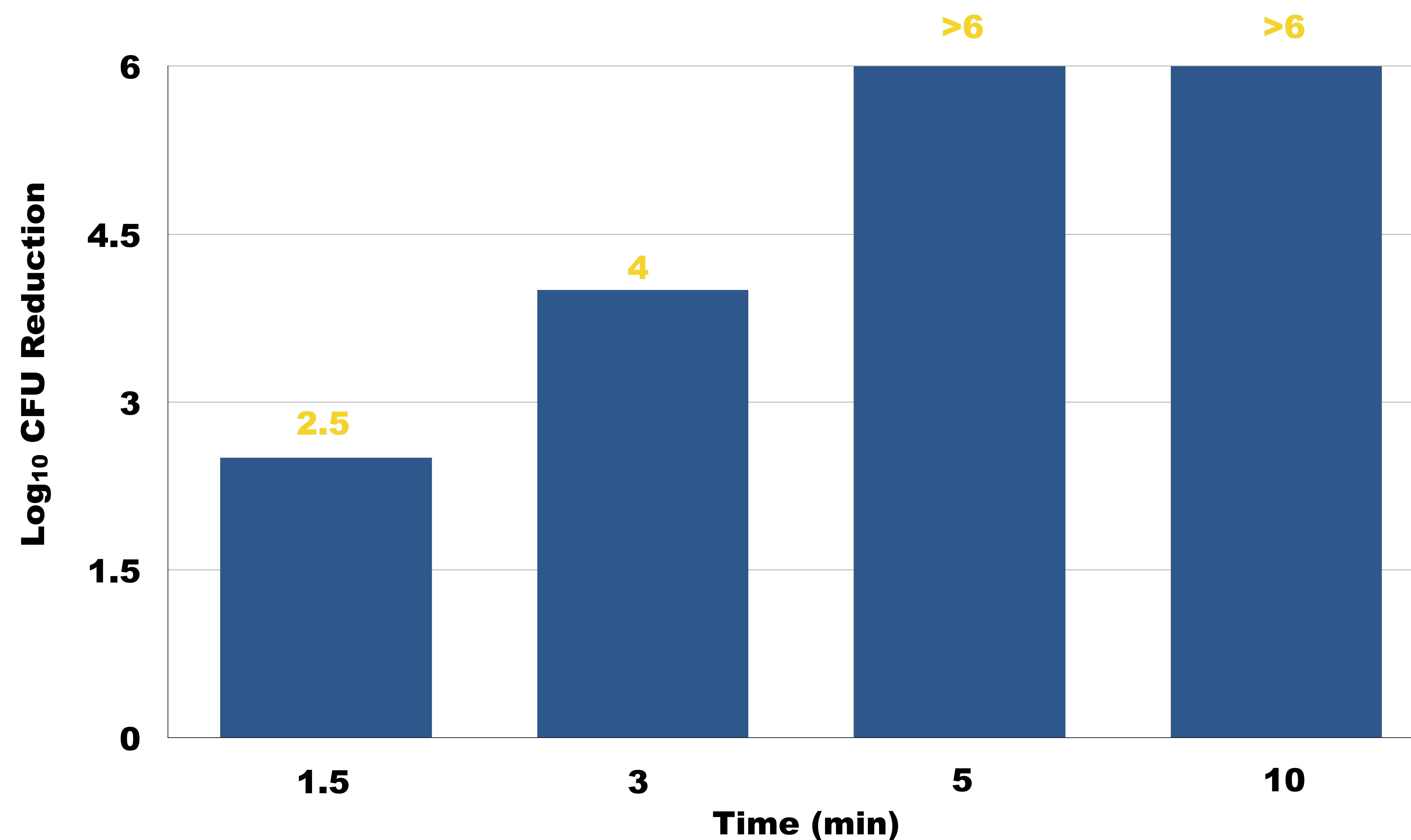
## Background

- ◆ The use of disposable or single-use filtering facepiece respirators (FFRs), like N95s, are an important component of personal protective equipment for healthcare personnel in treating patients with a respiratory virus and not approved for reuse.
- ◆ The current pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has resulted in the limited availability of respirators.
- ◆ This experiment examines the effectiveness of a targeted ultraviolet C (UVC) device for the decontamination of a single-use respirator.

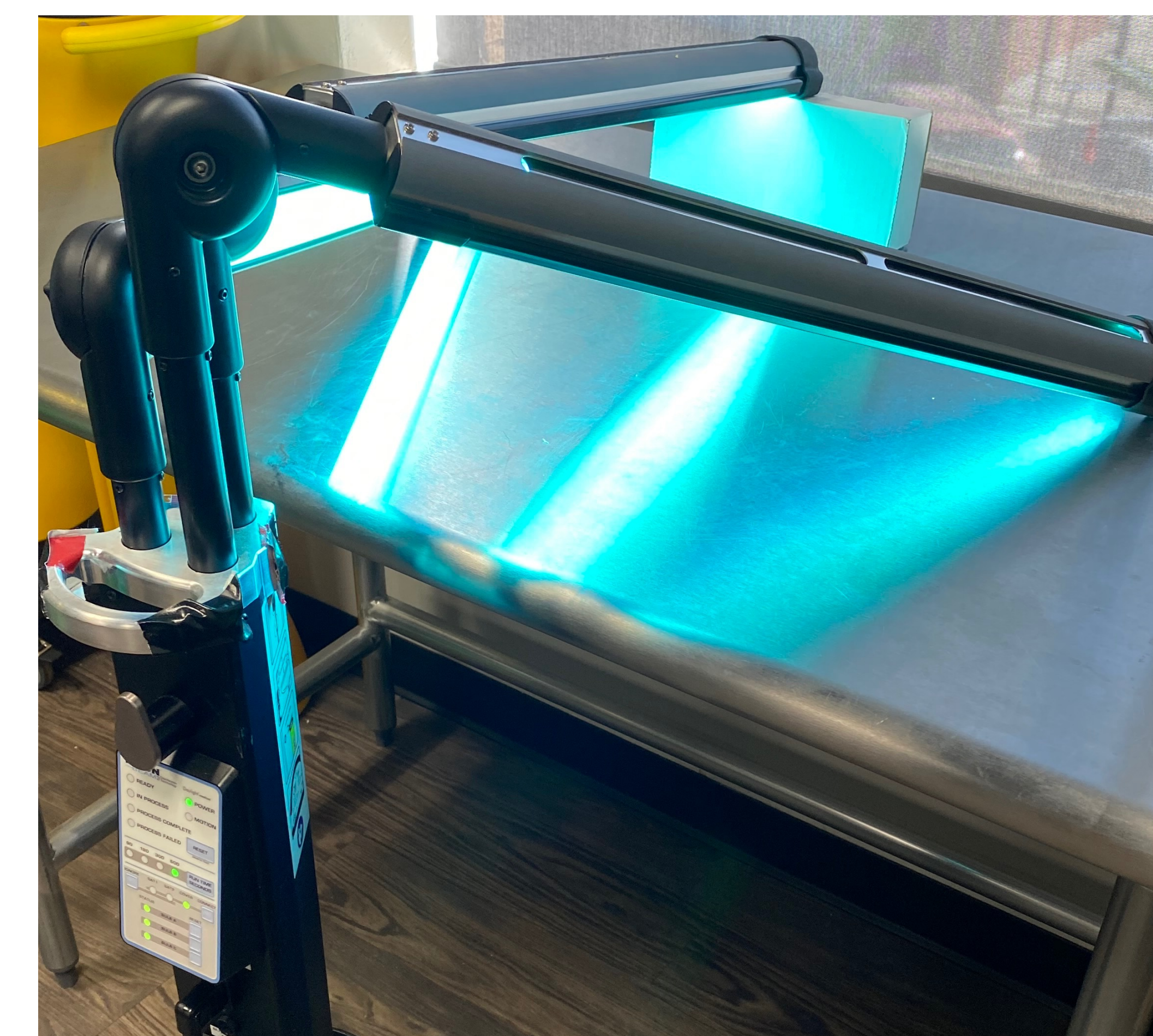
## Methods

- ◆ A 6 mm cotton disk was inoculated with a 10  $\mu$ L aliquot of *Bacillus subtilis* endospores.
- ◆ The disks were placed directly under the UVC light with 6 inches between the bulb and disk and exposed for 90 seconds, 3 minutes, 5 minutes, and 10 minutes, respectively.
- ◆ After specified exposure time, the disks were turned over, and the other side was exposed for the same time interval as the previous side.
- ◆ Disks were placed in a 10 mL nutrient broth and incubated at 30°C for 48 hours. The serially diluted specimens were plated onto nutrient agar, incubated for 48 hours, and the log<sub>10</sub> colony forming units (CFU) reductions were enumerated and compared to controls.

### Figure 1. Mean Log<sub>10</sub> CFU Reduction of *Bacillus subtilis* Spores at Various Exposure Times



### Figure 2. Experimental Setup with Ultraviolet Light Device



## Results

- ◆ The log<sub>10</sub> CFU reduction of *B. subtilis* spores over all time intervals were significant when compared to controls.
- ◆ The mean reduction of spores on the cotton disks were 2.5 log after 90 seconds, 4 log after 3 minutes, and >6 log for both 5 and 10 minutes with no measurable recovery of spores for the last two exposures.

## Conclusions

- ◆ The use of targeted UVC was very successful in reducing the *B. subtilis* spores from a cotton disk within 90 seconds, and the 100% elimination of the spores after 5 minutes.
- ◆ Even though a pandemic virus was not used, the sporicidal efficacy suggests this device could be effective at inactivating SARS-CoV-2.
- ◆ Based upon these findings, a targeted UVC device could be utilized for the decontamination of a single-use respirator needed during times of shortages.

