

Supplementary Material

Experimental and Computational Analysis of Surgical Mask Effectiveness Against COVID-19 in Indoor Environment

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Table S1. Summary of different disinfection methods.

Method name	Experimental descriptions
Boiling	Samples were placed at 100°C water bath for 10 minutes.
Steaming	Samples were positioned in the centre of a steamer cooker [LKH1] at 100°C for 10 minutes.
Autoclave	Samples were wrapped with aluminium foil individually and positioned in the middle area of basket in an autoclave (Hirayama, HVE-50). The autoclave sterilization was set at 121 °C for 20 minutes (complete cycle time was 1.5 hour).
Household detergent	0.5% (w/v) of household detergent (Ultra Axion) was prepared by addition with deionised water (DI). Samples were immersed to the solution for 30 minutes, and then rinsed with DI water for 1 minute to remove remaining detergent.
75% Ethanol	Samples were immersed in 200 mL 75% (v/v) ethanol for 5 minutes.
95% Ethanol	Samples were immersed in 200 mL 95% (v/v) ethanol for 5 minutes.
Dry heating	An oven (Breville BOV820BSS, 2400 W) was used for heating the sample at 100°C for 15 minutes. The temperature was monitored by the infrared thermometer in the system.
Ultraviolet (UVC) light irradiation	Disinfection using irradiation was performed in a biosafety cabinet (NUAIRS, NU-425-400S) fitted with a wavelength of 254 nm (equivalent to 20W) tube for 10 minutes. Power density at the mask level was monitored by UVX Radiometer using a UV probe (UVX25 254nm). Samples were placed at a distance of 60 cm from the tube for irradiation using an average UVC intensity of 450 $\mu\text{W cm}^{-2}$. The samples were adjusted in every 5 minutes for even irradiation and further to eliminate area without irradiation.

Table S2. Boundary conditions of CFD simulations.

	Velocity (m s ⁻¹)	Pressure (Pa)	Temperature (°C)	Heat Flux (W)	CO ₂ ¹ concentration (ppm)	2% NaCl ² Droplet (mg m ⁻³)
Inlet	2.66	/	24.4	/	400	0
Outlet	/	0	/	/	/	/
Occupant	/	/	/	100	/	/
Nose	0.001	/	37	/	40000	5.24

¹ CO₂ stands for carbon dioxide

² NaCl stands for sodium chloride

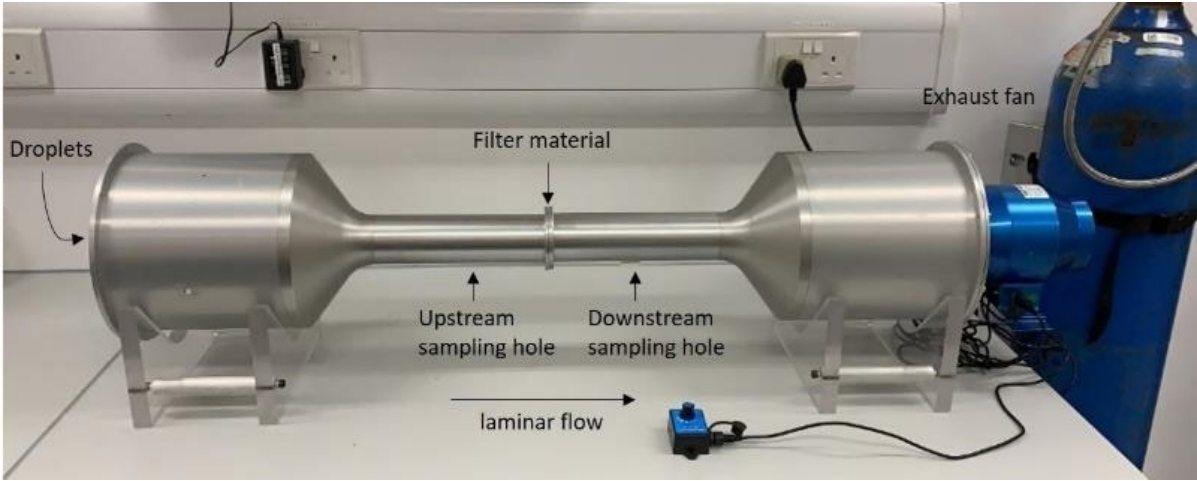


Fig. S1. Setup for filtration efficiency test

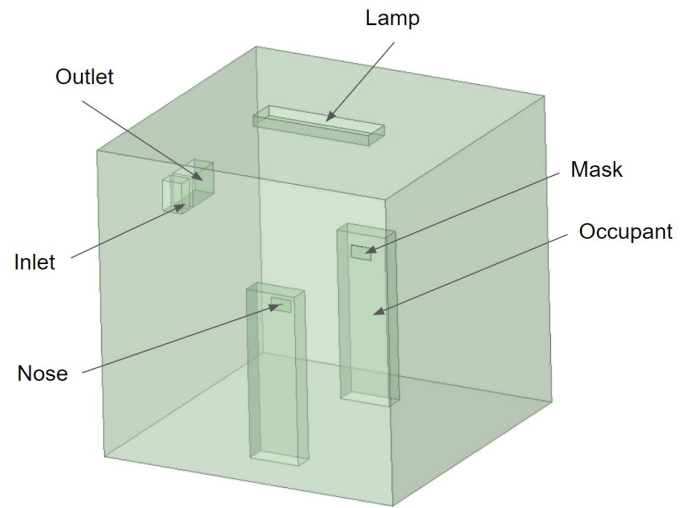


Fig. S2. 3D room model with air conditioner, lamp, occupants and mask