

A presentation on

HOMEMADE FACE MASKS – PERFORMANCE EVALUATIONS



GLOBAL CENTRE FOR
CLEAN AIR RESEARCH

UNIVERSITY OF SURREY

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Experimental conditions

Air/particle flow rate: 10 lpm

Aerosol generated with 0.05% KCl solution

Nebuliser air pressure = 0.6 bar

Filtration area: 2cm by 2cm

Duration of experiments: 1-hr (before & after filter)

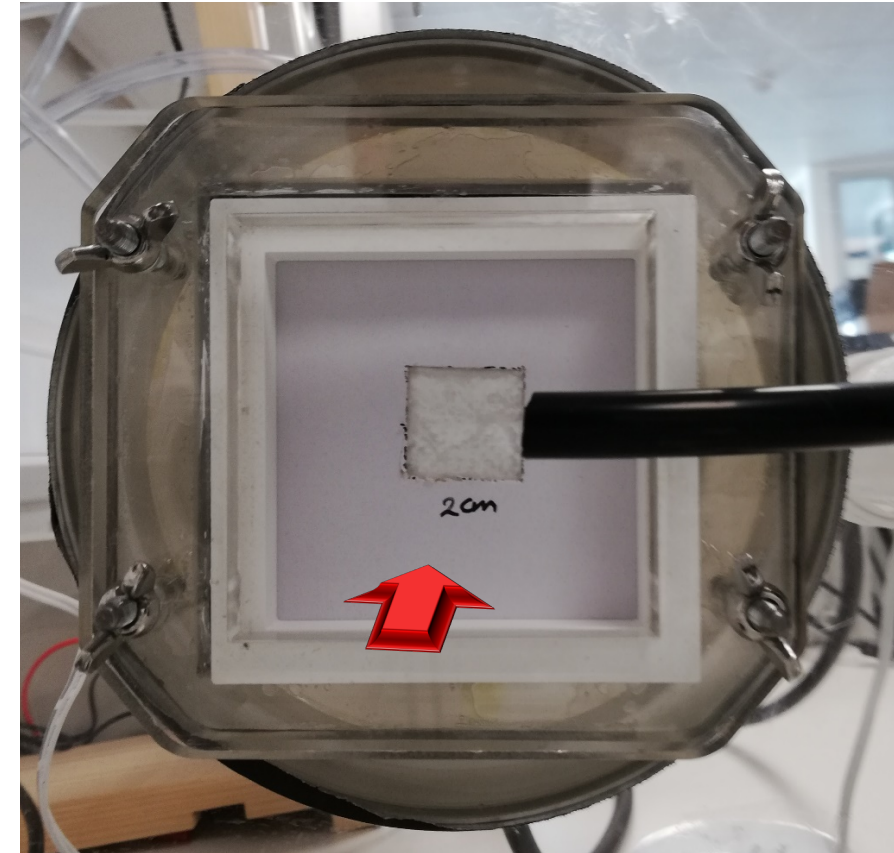
Sampling frequency: 10 sec

Solenoid switching system frequency: 60 sec

$$Efficiency = \frac{(C_{before} - C_{after})}{C_{before}}$$

C: Mass concentration
KCl density: 1984 kg/m³

Note: All the concentration calculations are obtained based on lognormal distribution (dN/dlogDp).



A sample filter during experiment

Face Masks



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X



Style X (folded)

Filter layers, Sides:

- 2x thin (30 gsm)

Centre:

- 1x thin
- 1x thick (50 gsm)

Y



Style Y (behind ears)

Filter layers

1x thin (30 gsm)



Style Y (behind ears)

Filter layers

2x thin (30 gsm)

Z



Style Z (tied)

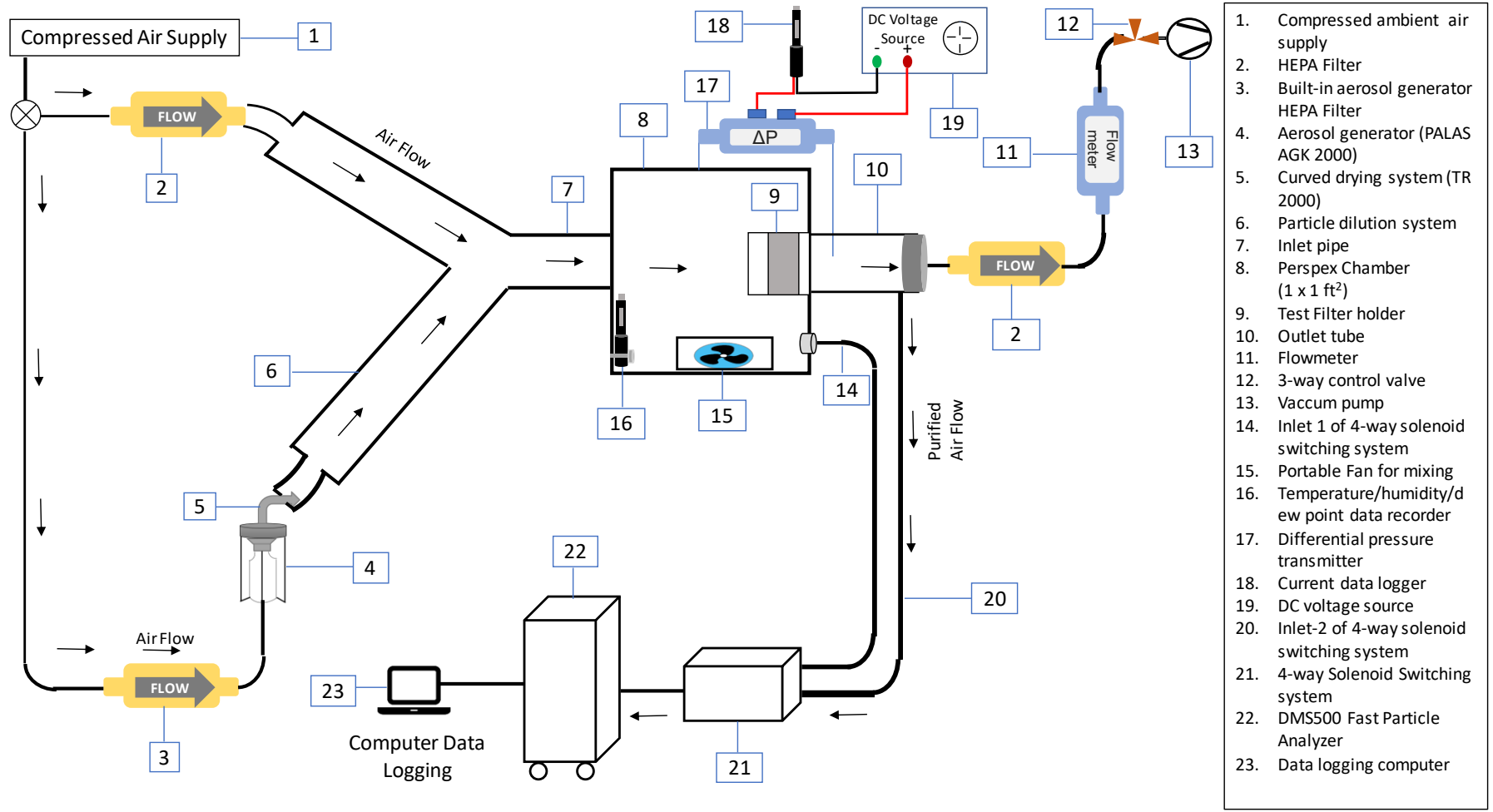
Filter layers

2x thin (30 gsm)

<https://www.yorkscrubs.co.uk/projects/face-coverings>

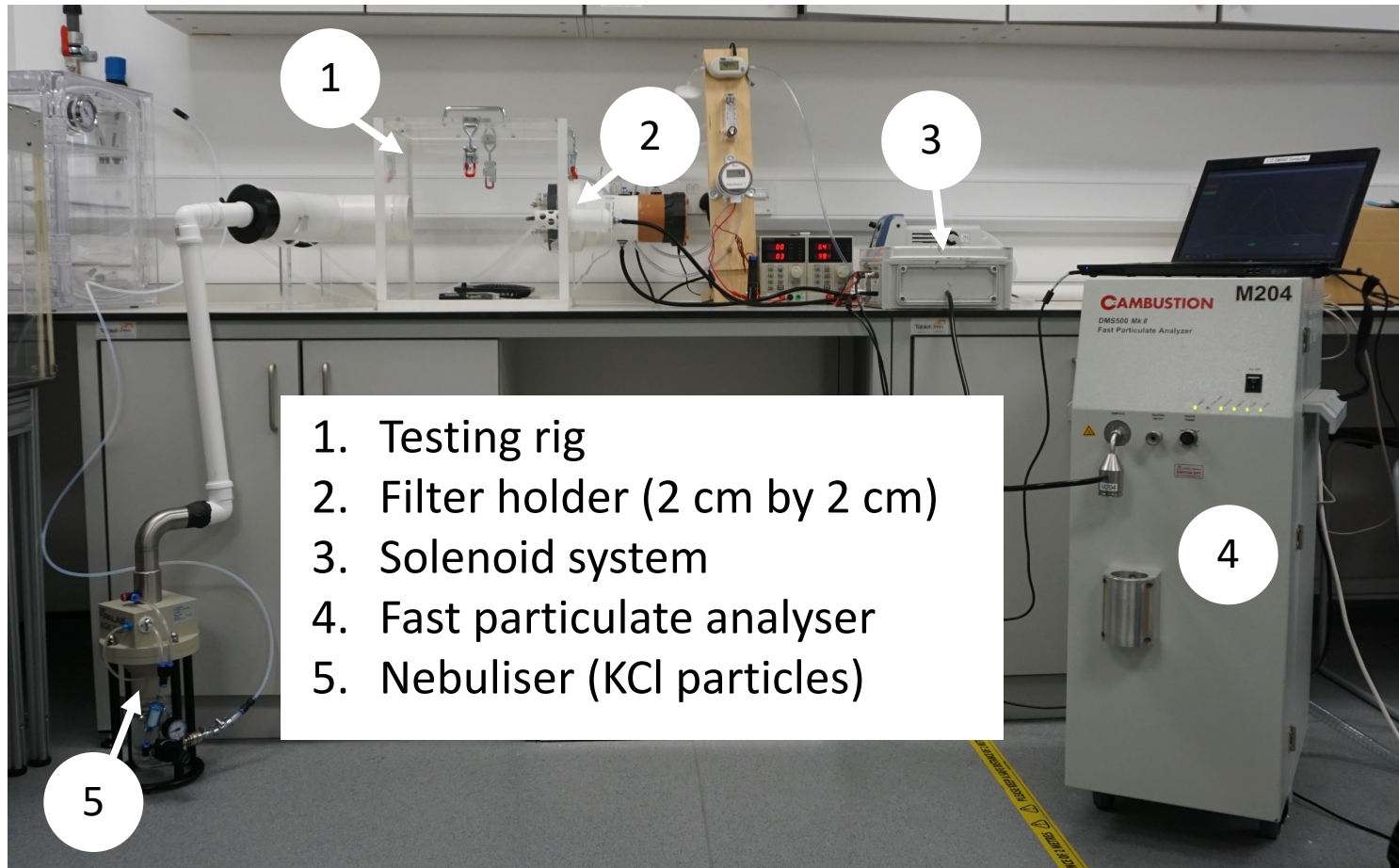


Testing Rig

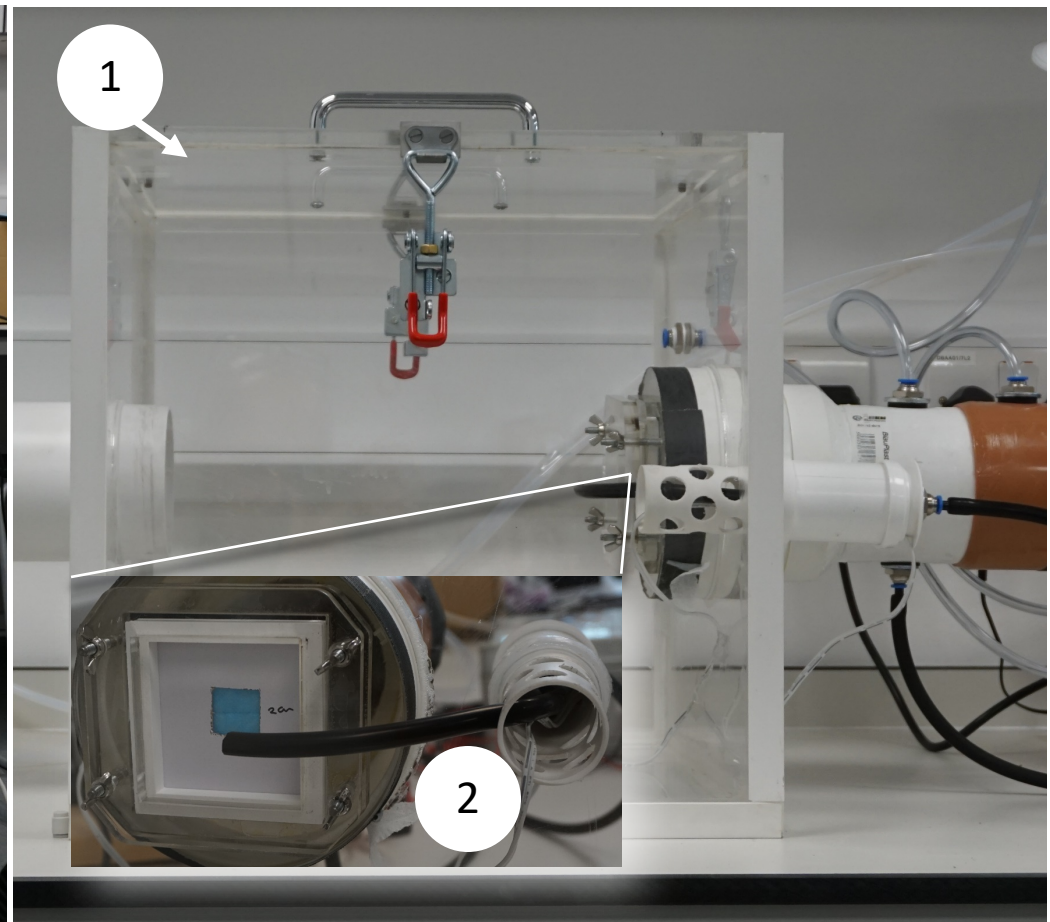


1. Compressed ambient air supply
2. HEPA Filter
3. Built-in aerosol generator HEPA Filter
4. Aerosol generator (PALAS AGK 2000)
5. Curved drying system (TR 2000)
6. Particle dilution system
7. Inlet pipe
8. Perspex Chamber (1 x 1 ft²)
9. Test Filter holder
10. Outlet tube
11. Flowmeter
12. 3-way control valve
13. Vacuum pump
14. Inlet 1 of 4-way solenoid switching system
15. Portable Fan for mixing
16. Temperature/humidity/dew point data recorder
17. Differential pressure transmitter
18. Current data logger
19. DC voltage source
20. Inlet-2 of 4-way solenoid switching system
21. 4-way Solenoid Switching system
22. DMS500 Fast Particle Analyzer
23. Data logging computer

Testing Rig



- 1. Testing rig
- 2. Filter holder (2 cm by 2 cm)
- 3. Solenoid system
- 4. Fast particulate analyser
- 5. Nebuliser (KCl particles)



Face Masks

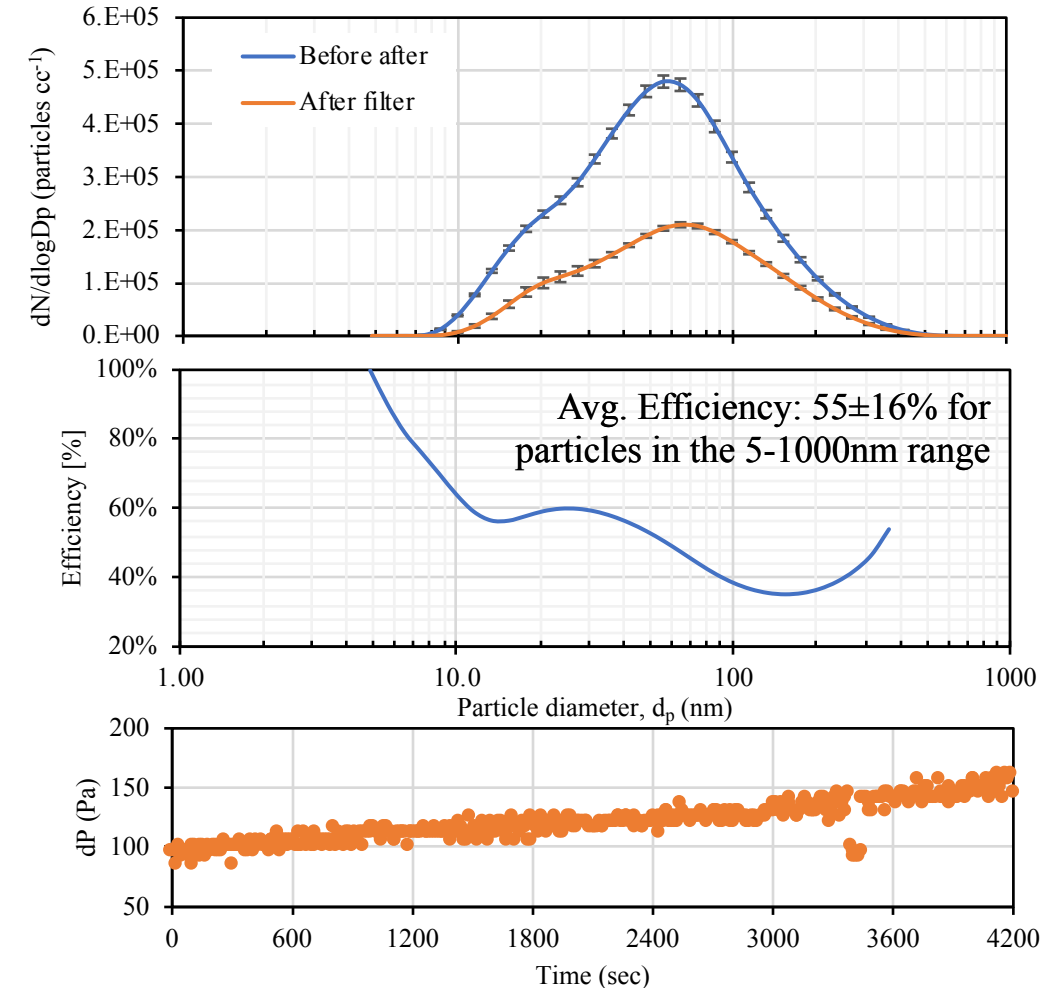
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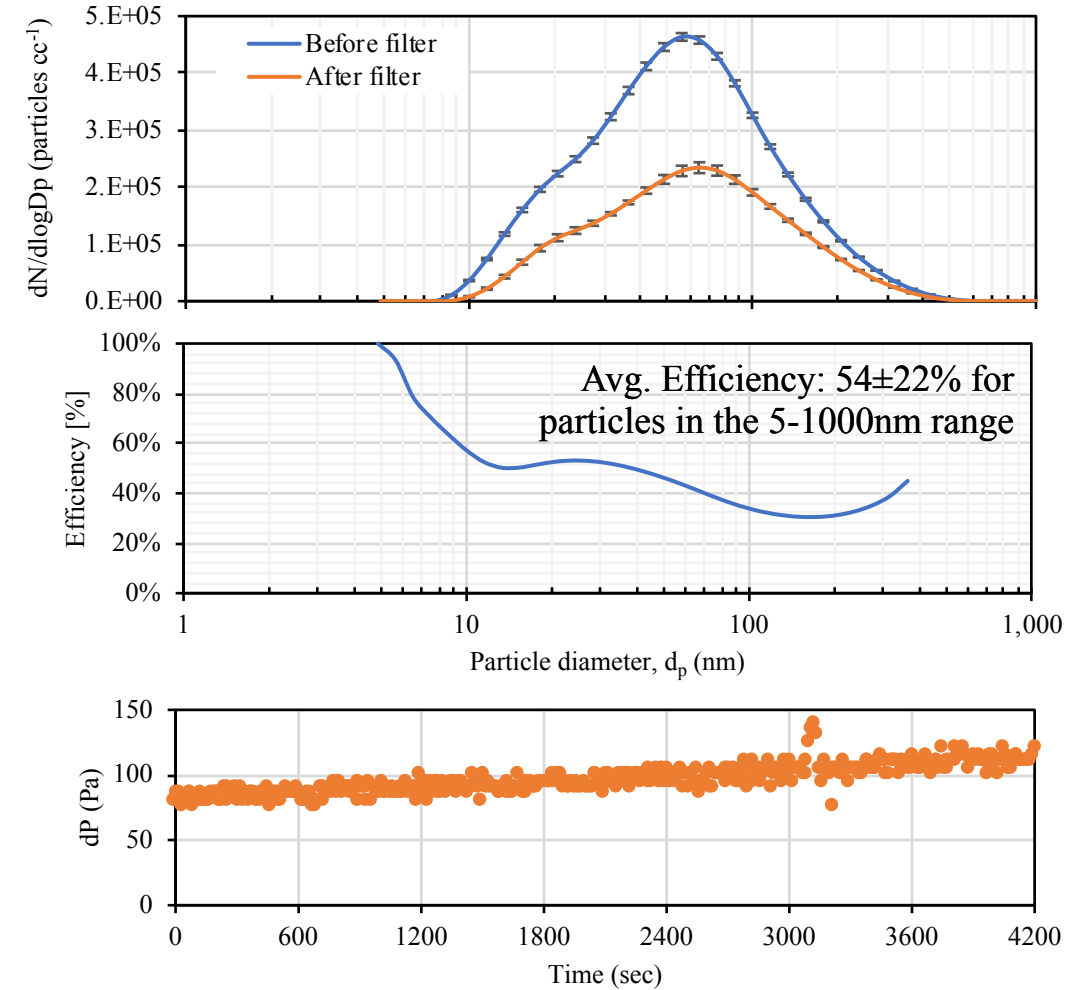


Face Masks



Style Y (behind ears)

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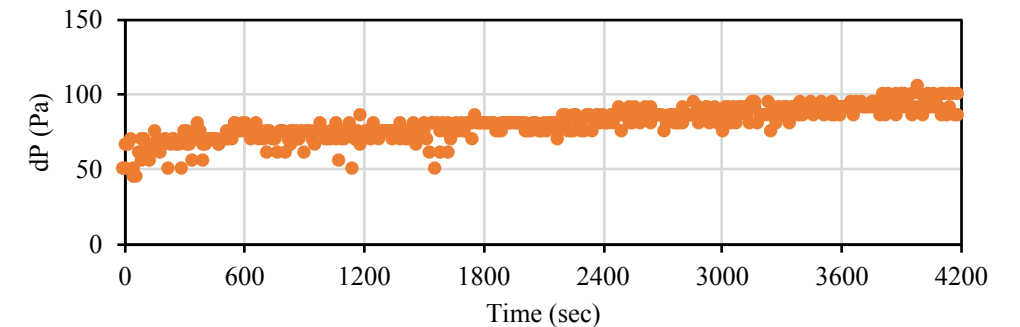
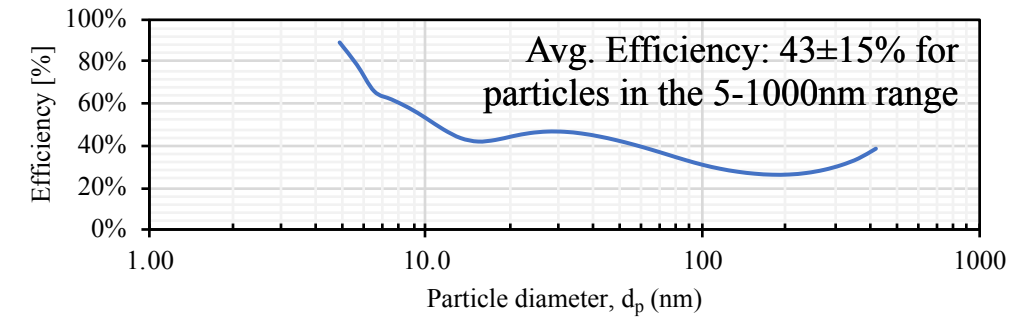
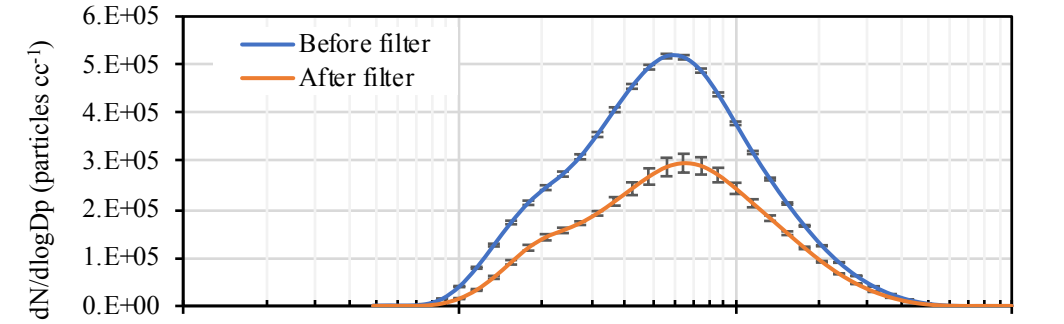
Face Masks



Style Z (tied)
Filter layers
2x thin (30 gsm)



Filter layers

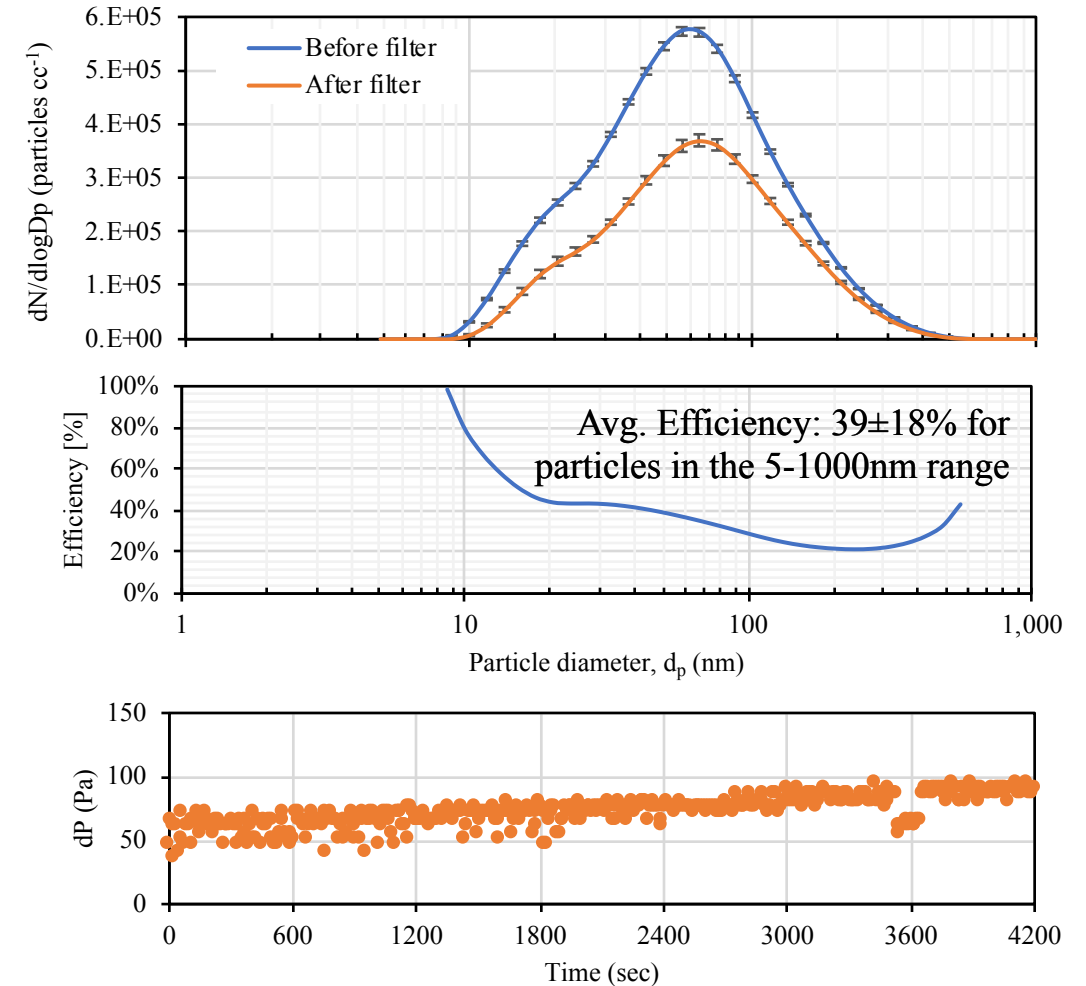


Face Masks

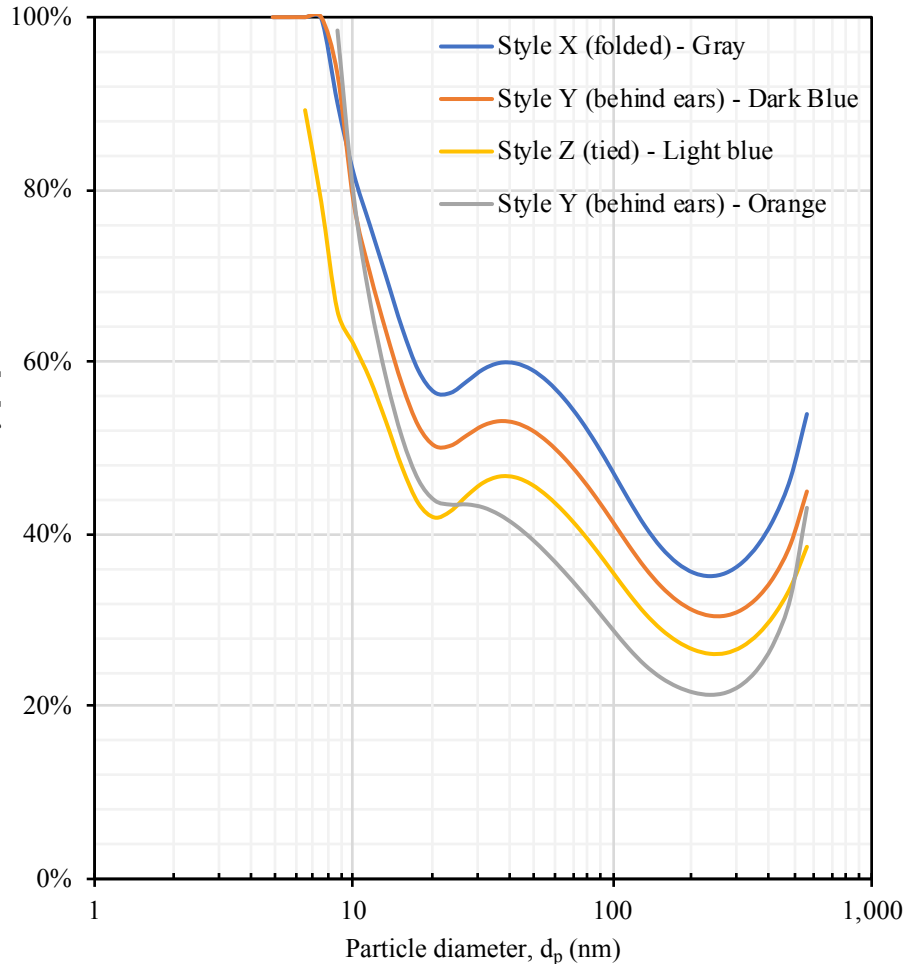


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Style Y (behind ears)

Filter layers

2x thin (30 gsm)



Style Z (tied)

Filter layers

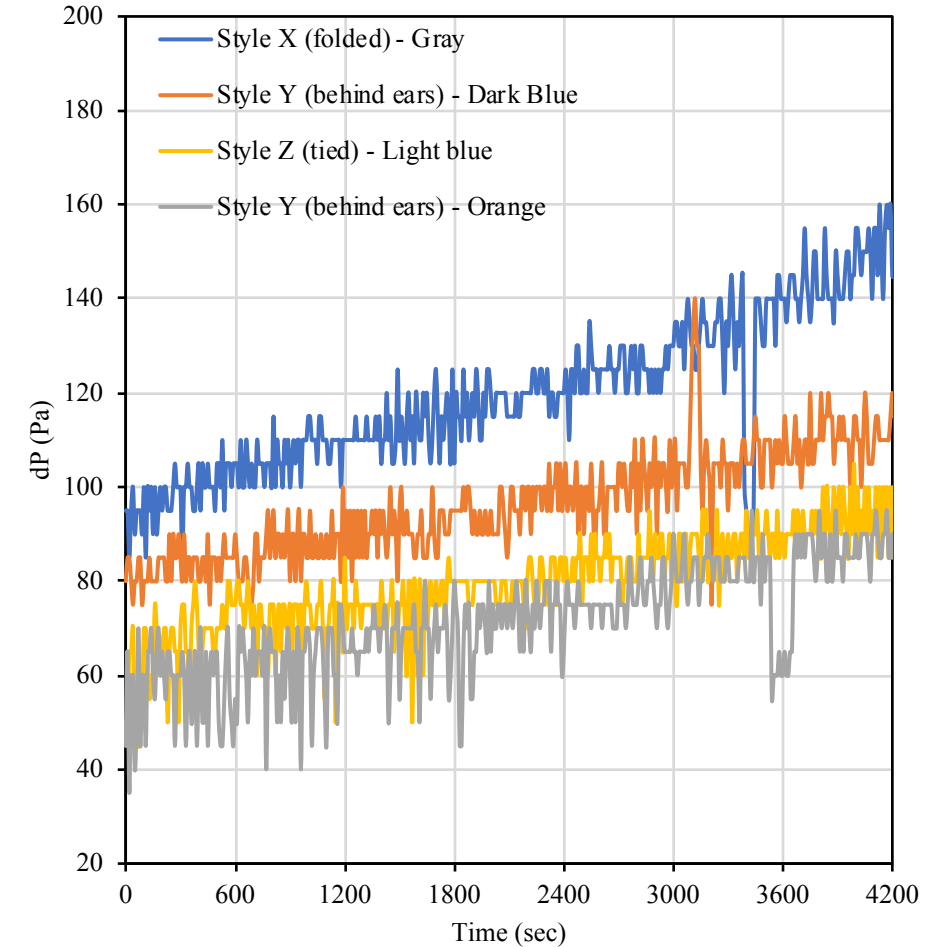
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Style Y (behind ears)

Filter layers

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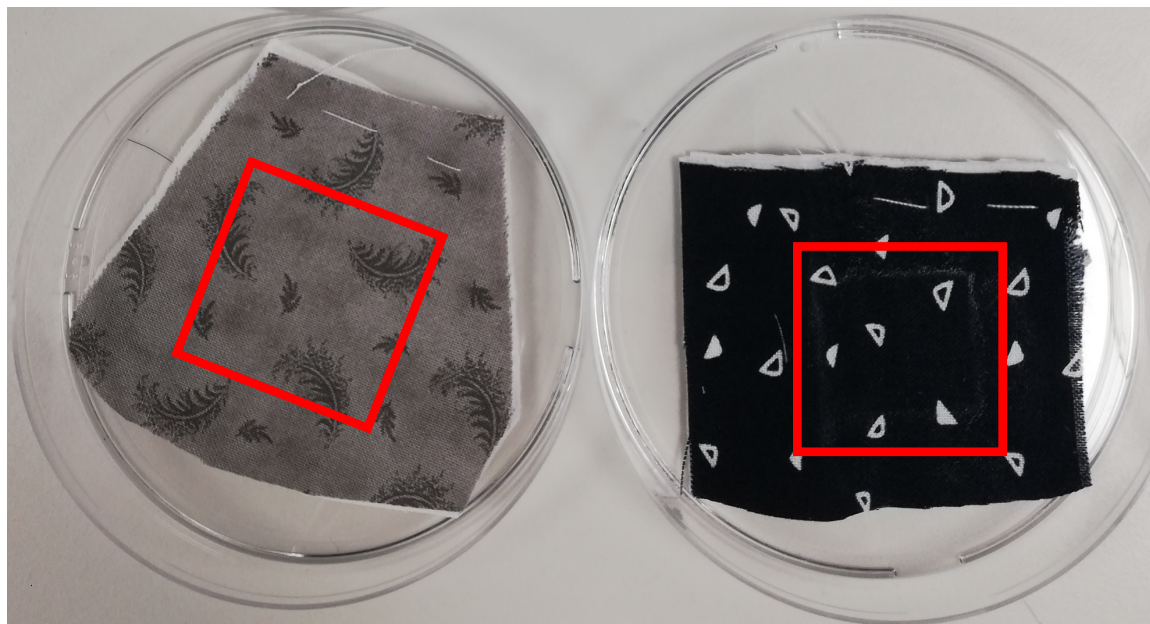


Exposed face masks (1-hr)



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Thank you

Contact

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