

## **Supplementary Materials**

### **Performance Textile Masks Materials in Varied Humidity: Filtration Efficiency, Breathability, and Quality Factor**

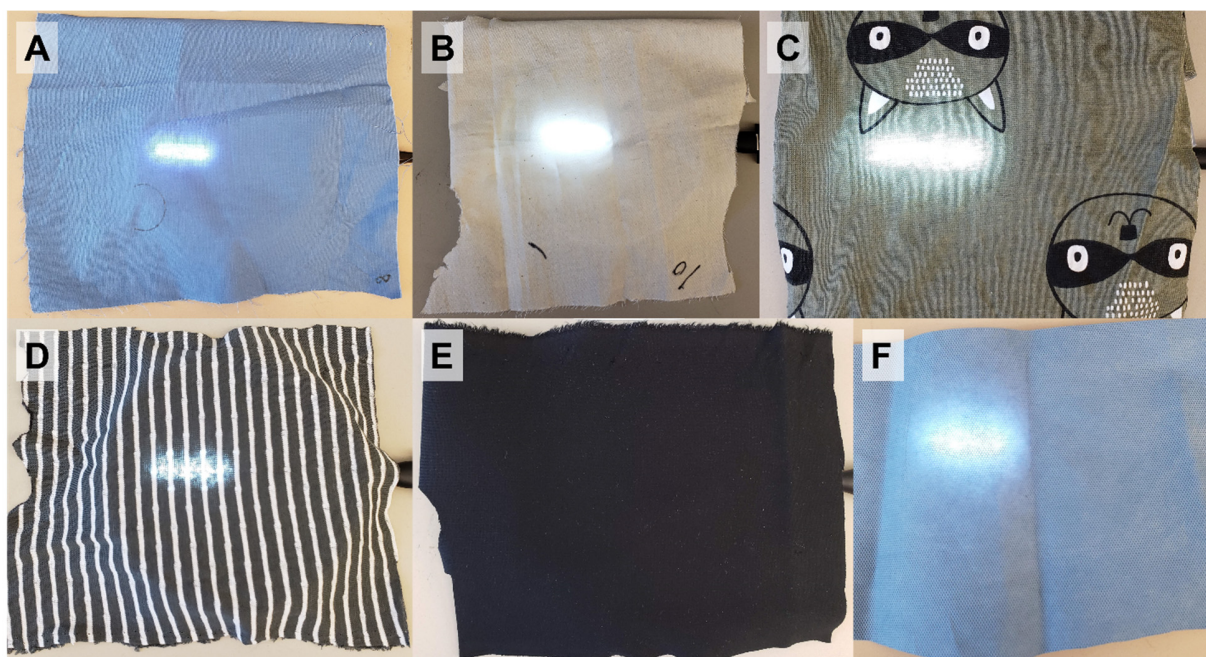
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**Figure S1.** Photos of some of the tested materials. Listing the materials starting from the top left and moving across are: Kona, Muslin, Cotton, Rayon, Rayon Cotton blend, and Surg. Wrap.

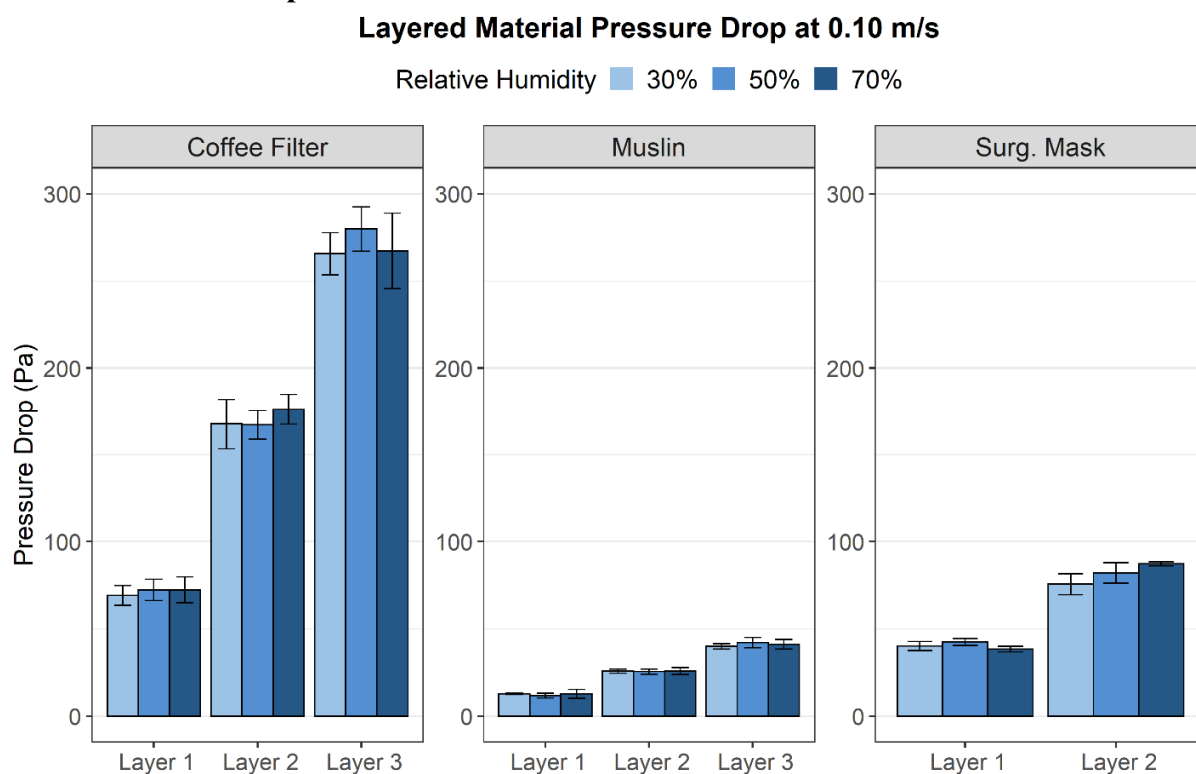
**Table S1.** Material list, description, and average filtration efficiency, pressure drop, and quality factor values. Materials are listed from highest quality factor to lowest. Average and standard deviation values are calculated across three experiments.

Material	Description	Average Filtration Efficiency (%)	Average Pressure Drop (Pa)	Average Quality Factor (Pa <sup>-1</sup> )
N95	3M Disposable N95 Respirator	99.96 ± 0.05	72.50 ± 1.78	0.10 ± 0.011
Surg. Mask*	Disposable Surgical Mask*	95.07 ± 3.58	42.53 ± 2.05	0.080 ± 0.023
P100 3M	3M P100 Filter	99.95 ± 0.06	135.63 ± 11.87	0.054 ± 0.0069
Thinsulate	100 gm Thinsulate	67.75 ± 16.99	50.93 ± 3.96	0.026 ± 0.014
Surg. Wrap	Heavy Weight Surgical Wrap made from SMS Polypropylene	55.77 ± 20.21	65.73 ± 0.93	0.015 ± 0.0093
Rayon Cotton Blend	82% Rayon 18% Cotton Knitted Blend from Jo-Ann's	2.86 ± 3.76	6.40 ± 0.66	0.0051 ± 0.0058
Rayon	100% Rayon	35.95 ± 16.15	99.03 ± 5.69	0.0049 ± 0.0032

Cotton	100% Knitted Cotton from Jo-Ann's	$2.59 \pm 3.67$	$8.73 \pm 1.58$	$0.0037 \pm 0.0043$
Muslin*	100% Muslin Cotton*	$4.73 \pm 5.08$	$11.73 \pm 1.36$	$0.0045 \pm 0.0045$
Coffee Filter*	Coffee Filter*	$31.29 \pm 11.52$	$72.30 \pm 6.14$	$0.0054 \pm 0.0025$
Kona	100% Kona Cotton	$18.23 \pm 8.80$	$44.00 \pm 0.36$	$0.0047 \pm 0.0026$
Silk	100% Woven Silk	$30.99 \pm 15.78$	$98.67 \pm 9.62$	$0.0041 \pm 0.0027$

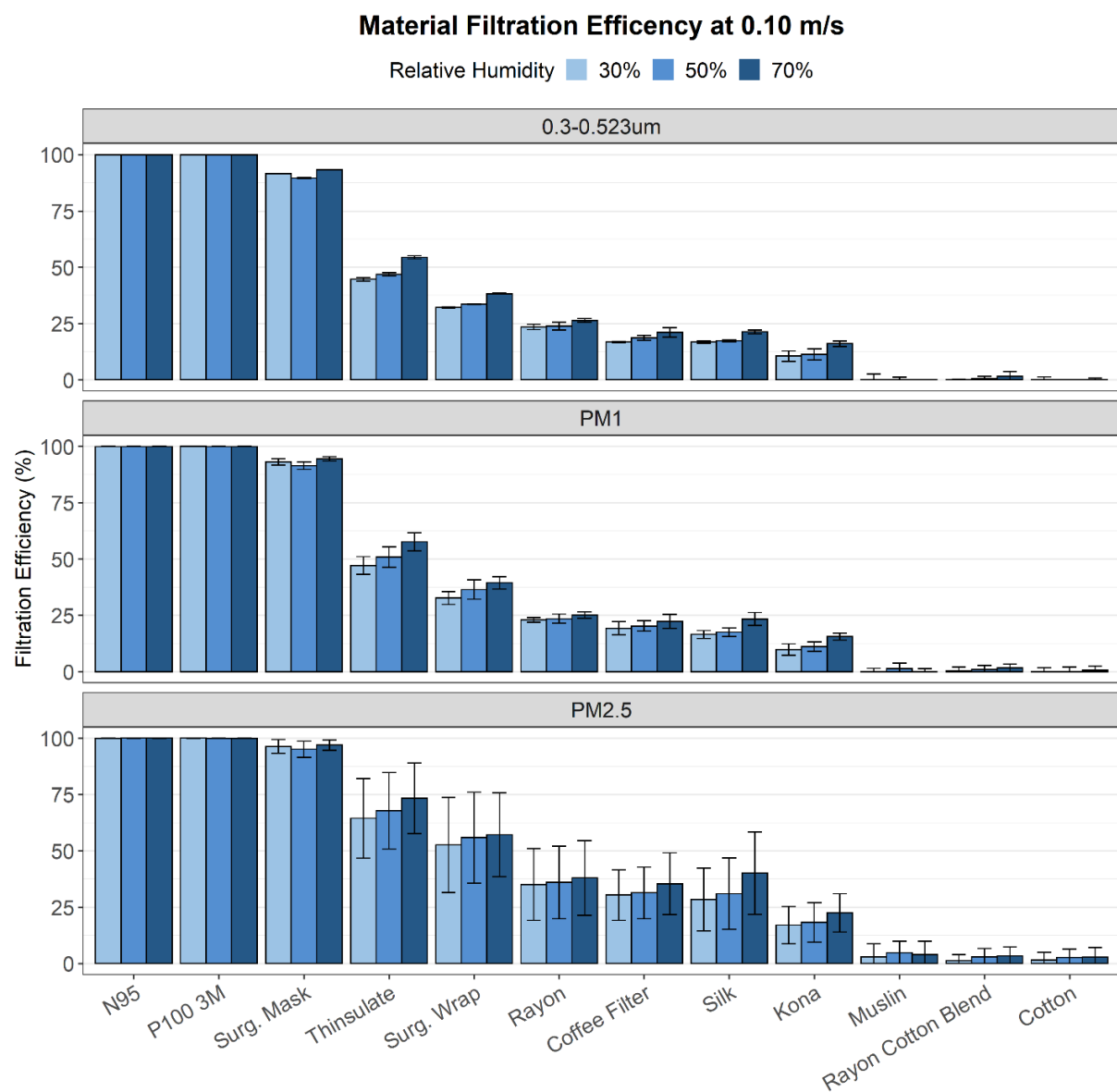
## 1. Results and Discussion

### 1.2 Pressure Drop



**Figure S2.** Pressure drop results for layered materials as a function of RH. Bar colors represent the corresponding RH value and results are plotted as the average pressure drop from three runs, with the error bars representing the standard deviation.

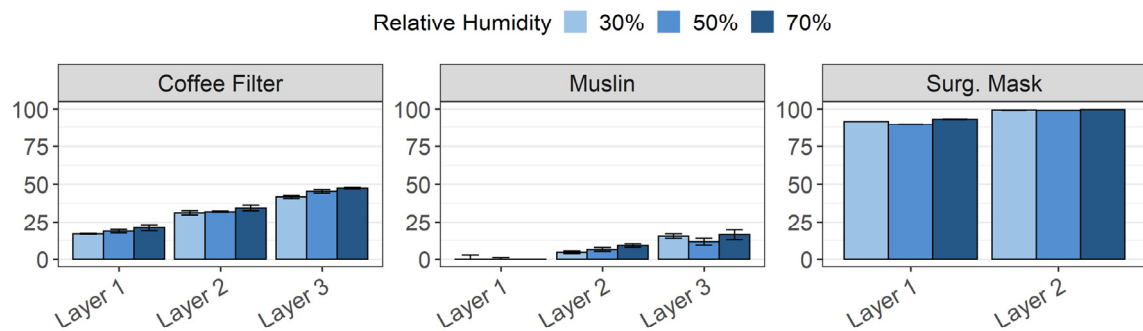
### 1.3 Filtration Efficiency



**Figure S3.** Filtration efficiency results for single layered materials as a function of relative humidity. Bar colors represent the corresponding RH values with the results plotted at the average filtration efficiency from three experimental runs with the error bars representing the standard deviation.

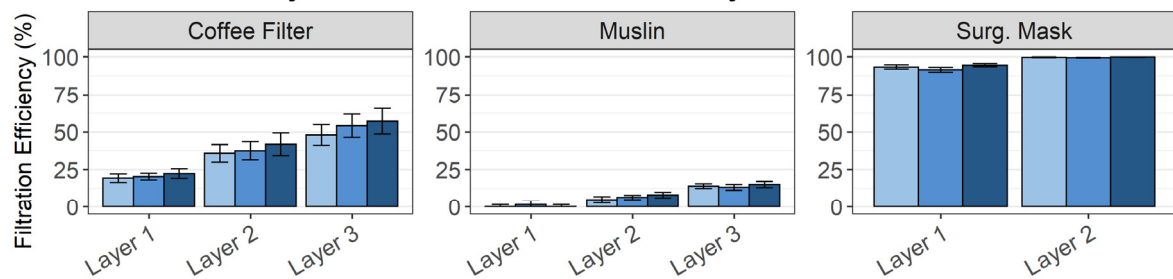
A

### Layered Material Filtration Efficiency for 0.3-0.523 $\mu$ m at 0.10 m/s



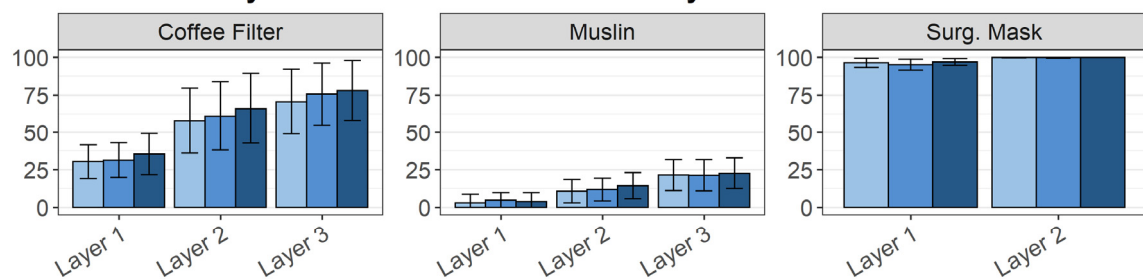
B

### Layered Material Filtration Efficiency for PM1 at 0.10 m/s



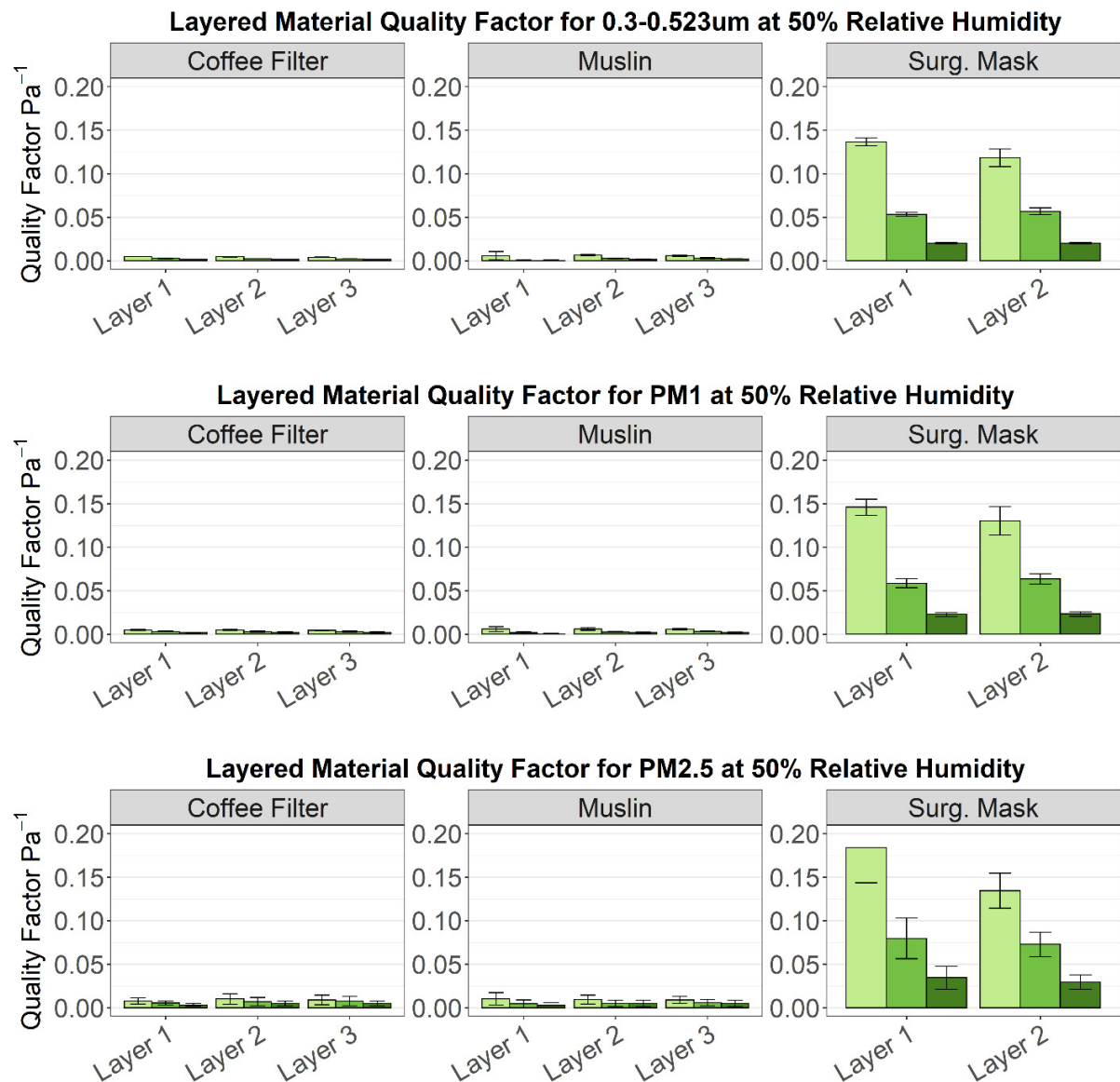
C

### Layered Material Filtration Efficiency for PM2.5 at 0.10 m/s



**Figure S4.** Filtration efficiency results for layered materials as a function of relative humidity. Bar colors represent the corresponding RH values with the results plotted at the average filtration efficiency from three experimental runs with the error bars representing the standard deviation.

## 1.4 Quality Factor



**Figure S5.** Quality factor results for layered materials when face velocity is varied. The quality factor results use the average filtration efficiency and pressure drop readings taken from three experiments to calculate three individual quality factor values. Error bars in the figure represent the standard deviation across these three quality factor values while the bar colors represent the corresponding face velocity values.