Supporting Information

Mask Material Filtration Efficiency and Mask Fitting at the Crossroads: Implications during Pandemic Times

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Information on the commercial respirators and mask materials investigated in this study:

The filtration efficiency was determined using the same number, sequence and orientation of sheets as those used in the respirator/mask fit testing. The N95 and KN95 respirators were used as purchased. The 3D-printed Montana masks were used with three different air filters. The two insert filters were MERV 13s: an AIRx Health MERV 13 pleated air filter (MERV 13-AIRx filter; AIRx Health MERV 13 Pleated Air Filter, 2020) and a Honeywell Elite Allergen MERV 13 pleated air filter (MERV 13-H filter; Honeywell Elite Allergen MERV 13 Pleated Air Filter, 2020). The third was a Honeywell Filter R True HEPA Replacement Filter (HEPA filter; Honeywell Filter R True HEPA Replacement Filter, 2020). The MERV 13 filter Montana masks had one sheet each; the HEPA filter Montana mask had two sheets of the appropriate filter inserted. Duckbill masks were made from two sheets of the WypAll X80 reusable wipe (WypAll X80 Reusable Wipes, 2020) or two blue sheets of the Halyard H600 sterilization wrap (Halyard H600 Sterilization Wrap, 2020).
Figure S1. An example of a circular area cut from each mask to evaluate the mask material filtration efficiency. This example shows a mask made from the WypAll X80 reusable wipe.
Figure S2. Infrared (a) and Raman (b) spectra of layers in the HDX N95 respirator showing polypropylene in layer #1, polyester in layer #2, polypropylene in layer #3, and polypropylene and polyester in layer #4. FE-SEM top view images of fibers in c) upstream layer #1; d) layer #2; e) layer #3; and f) downstream layer #4.
**Figure S3.** Infrared (a) and Raman (b) spectra of layers in the AOXING KN95 respirator showing polypropylene in layer #1, polyethylene and polypropylene in layer #2, polypropylene in layer #3, and polypropylene in layer #4. FE-SEM top view images of fibers in c) upstream layer #1; d) layer #2; e) layer #3; and f) downstream layer #4.
Figure S4. Infrared (a) and Raman (b) spectra of layers in the NANO KN95 respirator showing polypropylene in layer #1, polypropylene in layer #2, polypropylene in layer #3, and polypropylene in layer #4. FE-SEM top view images of fibers in c) upstream layer #1; d) layer #2; e) layer #3; and f) downstream layer #4.
Infrared (a) and Raman (b) spectra of layers in the ARUN KN95 respirator showing polypropylene in layer #1, polypropylene in layer #2, polypropylene in layer #3, and polypropylene in layer #4. FE-SEM top view images of fibers in c) upstream layer #1; d) layer #2; e) layer #3; and f) downstream layer #4.

Figure S5.
Figure S6. Infrared (a) and Raman (b) spectra of a single sheet of the MERV 13-AIRx filter showing polypropylene and polyethylene. (c, d) FE-SEM top view images of fibers in a single sheet of the MERV 13-AIRx filter: c) upstream side; d) downstream side. e) Higher magnification FE-SEM top view image of the net-like structure on the upstream side seen in c). f) FE-SEM cross-section view image of the single sheet of the MERV 13-AIRx filter showing the absence of different layers in the filter/uniformity of fiber diameters throughout the cross-section.
Figure S7. Infrared (a) and Raman (b) spectra of a single sheet of the MERV 13-H filter showing polypropylene. c) FE-SEM top view image of fibers in a single sheet of the MERV 13-H filter on the upstream side. d) FE-SEM cross-section view image of the single sheet of the MERV 13-H filter showing the absence of different layers in the filter/uniformity of fiber diameters throughout the cross-section.
Figure S8. Infrared (a) and Raman (b) spectra of a single sheet of the HEPA filter showing polyethylene terephthalate in the top and bottom layers, and polypropylene in the middle layer. (c-e) FE-SEM top view images of fibers in a single sheet of the HEPA filter: c) top layer; d) middle layer; e) bottom layer. f) FE-SEM cross-section view image of the single sheet of the HEPA filter showing (from top to bottom) top (upstream), middle, and bottom (downstream) layers.
**Figure S9.** Infrared (a) and Raman (b) spectra of a single sheet of WypAll X80 reusable wipe showing polypropylene and cellulose. (c-d) FE-SEM top view images of fibers in a single sheet of the WypAll X80 reusable wipe: c) upstream wipe side; d) downstream wipe side. e) FE-SEM cross-section view image of the single sheet showing the upstream wipe side (top) and the downstream wipe side (bottom).
**Figure S10.** Infrared (a) and Raman (b) spectra of a single sheet of the Halyard H600 sterilization wrap, showing polypropylene. (c-e) FE-SEM top view images of fibers in a single sheet of the Halyard H600 sterilization wrap: c) top layer; d) middle layer; e) bottom layer. f) FE-SEM cross-section view image of the single sheet of the Halyard H600 sterilization wrap showing (from top to bottom) top (upstream), middle, and bottom (downstream) layers.
Reference


