

CLAIMS

1. A disposable mask comprising a mask body, which includes a periphery, and straps attached to the mask body proximate the periphery for releasably retaining the mask on a user's face, the mask body including: an inner layer, which is a polymeric plastic material with a plurality of passageways therethrough, and which has an inner surface and an outer surface; and a porous glass filter which is functionalized with a visible light photocatalyst and abuts the outer surface of the inner layer.
2. The disposable mask of claim 1, wherein the visible light photocatalyst is a low iron oxide, iron-doped titanium dioxide nanoparticle.
3. The disposable mask of claim 2, wherein the porous glass filter is in a filter zone bounded by a boundary zone, the boundary zone comprising the inner layer and extending from the filter zone to the periphery.
4. The disposable mask of claim 2 or 3, wherein the porous glass filter is a fiberglass fabric.
5. The disposable mask of any one of claims 2 to 4, wherein the low iron oxide, iron-doped titanium dioxide nanoparticles have substantially iron oxide free surfaces.
6. The disposable mask of any one of claims 2 to 5, the mask body further comprising a formable border proximate the periphery of the inner surface of the inner layer.
7. The disposable mask of any one of claims 2 to 6, the mask body further comprising a transparent outer cover which is a polymeric plastic material with a plurality of passageways therethrough and abuts the fiberglass filter.
8. The disposable mask of any one of claims 2 to 7, the mask body further comprising a filter layer, the filter layer abutting the outer surface of the inner layer.
9. The disposable mask of claim 8, wherein the filter layer consists of unbonded plastic polymer fibers.
10. A method of reducing pathogens in air inhaled and exhaled by a user, the method comprising providing a disposable mask which a mask body, which includes a periphery, and straps attached to the mask body proximate the periphery for releasably retaining the mask on a user's face, the mask body including: an inner layer, which is a polymeric plastic material with a plurality of passageways

therethrough, and which has an inner surface and an outer surface; and a porous glass filter which is functionalized with a visible light photocatalyst and abuts the outer surface of the inner layer; the user putting the disposable mask on their face; and the user breathing through the disposable mask.

11. The method of claim 10, wherein the mask body reduces mean tidal volume by no more than about 16.2 %.
12. A face mask comprising an optically transparent or optically semi-transparent mask body, a periphery about an edge of the optically transparent or optically semi-transparent mask body and straps attached to the mask body proximate to the periphery or attached to the periphery for releasably retaining the mask on a user's face, the mask body including: an inner layer, which is an optically transparent or optically semi-transparent material with a plurality of passageways therethrough, and which has an inner surface and an outer surface; and a fiberglass fabric layer which abuts the outer surface of the inner layer and which comprises fiberglass ribbons.
13. The face mask of claim 12, wherein the fiberglass fabric is functionalized with a visible light photocatalyst.
14. The face mask of claim 13, wherein a refractive index of the optically transparent or optically semi-transparent material of the inner layer and a refractive index of the fiberglass ribbons of the fiberglass fabric layer are within about 0.06 of one another.
15. The face mask of claim 13 or 14, wherein the visible light photocatalyst is low iron oxide, iron-doped titanium dioxide.
16. The face mask of claim 15, wherein the low iron oxide, iron-doped titanium dioxide is nanoparticles.
17. The face mask of claim 16, wherein the low iron oxide, iron-doped titanium dioxide nanoparticles have substantially iron oxide free surfaces.
18. The face mask of any one of claims 12 to 17, the mask body further comprising a formable border proximate to the periphery.
19. The face mask of any one of claims 15 to 18, the mask body further comprising an outer cover which is an optically transparent or optically semi-transparent material

with a plurality of passageways therethrough and which abuts the fiberglass fabric layer.

20. The face mask of claim 19, wherein a refractive index of the optically transparent or optically semi-transparent material of outer cover, the refractive index of the optically transparent or optically semi-transparent material of the inner layer and the refractive index of the fiberglass ribbons of the fiberglass fabric layer are within about 0.060.
21. The face mask of any one of claims 15 to 20, the mask body further comprising an optically transparent or optically semi-transparent filter layer, the filter layer between the outer surface of the inner layer and the fiberglass fabric layer.
22. The face mask of claim 21, wherein the optically transparent or optically semi-transparent filter layer consists of unbonded plastic polymer fibers.
23. The face mask of claim 22, wherein a refractive index of the unbonded plastic polymer fibers, the refractive index of the optically transparent or optically semi-transparent material of the outer cover, the refractive index of the optically transparent or optically semi-transparent material of the inner layer and the refractive index of the fiberglass ribbons of the fiberglass fabric layer are within about 0.060.
24. The face mask of any one of claims 15 to 23, wherein the inner layer comprises a silk fibroin or a rayon material.
25. The face mask of claim 24, wherein the inner layer is a silk fibroin material.
26. The face mask of any one of claims 15 to 25, wherein the outer layer comprises a silk fibroin or rayon material.
27. The face mask of claim 26, wherein the outer layer is a silk fibroin material.
28. The face mask of any one of claims 12 to 27 wherein the mask body is optically transparent.
29. The face mask of any one of claims 12 to 28, wherein the fiberglass fabric layer consists of fiberglass ribbons functionalized with low iron oxide, iron-doped titanium dioxide nanoparticles that have substantially iron oxide free surfaces.
30. A method of manufacturing an optically semi-transparent or optically transparent mask body for a face mask, the method comprising: selecting a fiberglass material

consisting of fiberglass ribbons functionalized with low iron oxide, iron-doped titanium dioxide nanoparticles; shaping the fiberglass material into a mask body shape; selecting an inner layer consisting of an optically transparent or optically semi-transparent material with a refractive index within 0.06 of a refractive index of the fiberglass material; shaping the optically transparent or optically semi-transparent material into the mask body shape; and attaching the inner layer to the fiberglass material, thereby manufacturing an optically semi-transparent or transparent mask body.

31. The method of claim 30, further comprising selecting an outer layer consisting of an optically transparent or optically semi-transparent material with a refractive index within 0.06 of the refractive index of the fiberglass material and the inner layer; and attaching the outer layer to the fiberglass material, thereby manufacturing an optically semi-transparent or transparent mask body.
32. An article of personal protection apparel, the article comprising a fiberglass fabric functionalized with a visible light photocatalyst.
33. The article of claim 32, wherein the visible light photocatalyst is a low iron oxide, iron-doped titanium dioxide nanoparticle.
34. The article of claim 33, wherein the low iron oxide, iron-doped titanium dioxide nanoparticles have substantially iron oxide free surfaces.
35. The article of any one of claims 32 to 34, wherein the article is selected from the group consisting of a cap, a gown, a hooded gown, a pair of booties and a pair of pants.
36. A face shield, the face shield comprising a band and a transparent visor which is attached to the band, the transparent visor functionalized with a visible light photocatalyst.
37. The face shield of claim 36, wherein the visible light photocatalyst is a low iron oxide, iron-doped titanium dioxide nanoparticle.
38. The face shield of claim 37, wherein the low iron oxide, iron-doped titanium dioxide nanoparticles have substantially iron oxide free surfaces.