

Claims:

1. A smoking device filter comprising:

a porous mass that itself comprises a plurality of active particles and a plurality of non-fibrous binder particles, wherein the active particles and the non-fibrous binder particles are bound together at a plurality of sintered contact points, and

wherein the active particles comprises at least one selected from the group consisting of: a nano-scaled carbon particle, a carbon nanotube having at least one wall, a carbon nanohorn, a bamboo-like carbon nanostructure, a fullerene, a fullerene aggregate, graphene, a few layer graphene, oxidized graphene, a iron oxide nanoparticle, a nanoparticle, a metal nanoparticle, a gold nanoparticle, a silver nanoparticle, a metal oxide nanoparticle, an alumina nanoparticle, a magnetic nanoparticle, a paramagnetic nanoparticle, a superparamagnetic nanoparticle, a gadolinium oxide nanoparticle, a hematite nanoparticle, a magnetite nanoparticle, a gado-nanotube, an endofullerene, Gd@C₆₀, a core-shell nanoparticle, an onionated nanoparticle, a nanoshell, an onionated iron oxide nanoparticle, and any combination thereof.

2. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles comprise a thermoplastic material.

3. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles comprise at least one selected from the group consisting of: ultrahigh molecular weight polyethylene, very high molecular weight polyethylene, high molecular weight polyethylene, a polyolefin, a polyester, a polyamide, a nylon, a polyacrylic, a polystyrene, a polyvinyl, polytetrafluoroethylene, polyether ether ketone, a non-fibrous plasticized cellulose, polyethylene, polypropylene, polybutylene, polymethylpentene, low-density polyethylene, linear low-density polyethylene, high-density polyethylene, polyethylene terephthalate, polybutylene terephthalate, polycyclohexylene dimethylene terephthalate, polytrimethylene terephthalate, polyacrylics, polymethyl methacrylate, polystyrene, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, styrene-butadiene, styrene-maleic anhydride, ethylene vinyl acetate, ethylene vinyl alcohol, polyvinyl chloride,

cellulose acetate, cellulose acetate butyrate, plasticized cellulose, cellulose propionate, ethyl cellulose, any derivative thereof, any copolymer thereof, and any combination thereof.

4. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles have a melt flow index less than or equal to about 3.5 g/10min at 190°C and 15 Kg.

5. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles have a particle size in at least one dimension ranging from about 0.1 nanometers to about 5000 microns.

6. The smoking device filter of claim 1, wherein the porous mass has a void volume of about 40% to about 90%.

7. The smoking device filter of claim 1, wherein the porous mass comprises a ratio of the active particles to the binder particles ranging from about 1 wt% active particles and about 99 wt% binder particles to about 99 wt% active particles and about 1 wt% binder particles.

8. The smoking device filter of claim 1, wherein the porous mass has an encapsulated pressure drop of about 0.1 to about 20 mm of water per mm length of porous mass.

9. A smoking device comprising a smokeable substance in fluid communication with the smoking device filter of claim 1.

10. A smoking device filter comprising:

a porous mass that comprises active particles and non-fibrous binder particles, wherein the active particles and the non-fibrous binder particles are bound together at a plurality of sintered contact points, wherein the active particle is not carbon, and wherein the porous mass has an active particle loading of at least about 1 mg/mm and an encapsulated pressure drop of about 20 mm of water or less per mm of porous mass.

11. The smoking device filter of claim 10, wherein at least some of the non-fibrous binder particles comprise at least one selected from the group consisting of: ultrahigh molecular weight polyethylene, very high molecular weight polyethylene, high molecular weight polyethylene, a polyolefin, a polyester, a polyamide, a nylon, a polyacrylic, a polystyrene, a polyvinyl,

polytetrafluoroethylene, polyether ether ketone, a non-fibrous plasticized cellulose, polyethylene, polypropylene, polybutylene, polymethylpentene, low-density polyethylene, linear low-density polyethylene, high-density polyethylene, polyethylene terephthalate, polybutylene terephthalate, polycyclohexylene dimethylene terephthalate, polytrimethylene terephthalate, polyacrylics, polymethyl methacrylate, polystyrene, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, styrene-butadiene, styrene-maleic anhydride, ethylene vinyl acetate, ethylene vinyl alcohol, polyvinyl chloride, cellulose acetate, cellulose acetate butyrate, plasticized cellulose, cellulose propionate, ethyl cellulose, any derivative thereof, any copolymer thereof, and any combination thereof.

12. The smoking device filter of claim 10, wherein at least some of the non-fibrous binder particles have a melt flow index less than or equal to about 3.5 g/10min at 190°C and 15 Kg.

13. The smoking device filter of claim 10, wherein the porous mass has a void volume of about 40% to about 90%.

14. The smoking device filter of claim 10, wherein the active particles comprises at least one selected from the group consisting of: an ion exchange resin, a desiccant, a silicate, a molecular sieve, a silica gel, activated alumina, a zeolite, perlite, sepiolite, Fuller's Earth, magnesium silicate, a metal oxide, iron oxide, activated carbon, and any combination thereof.

15. The smoking device filter of claim 10, wherein the active particles comprises at least one selected from the group consisting of: a iron oxide nanoparticle, a nanoparticle, a metal nanoparticle, a gold nanoparticle, a silver nanoparticle, a metal oxide nanoparticle, an alumina nanoparticle, a magnetic nanoparticle, a paramagnetic nanoparticle, a superparamagnetic nanoparticle, a gadolinium oxide nanoparticle, a hematite nanoparticle, a magnetite nanoparticle, a gado-nanotube, an endofullerene, Gd@C₆₀, a core-shell nanoparticle, an onionated nanoparticle, a nanoshell, an onionated iron oxide nanoparticle, and any combination thereof.

16. A smoking device comprising a smokeable substance in fluid communication with the smoking device filter of claim 10.

17. A smoking device filter comprising:

a porous mass that comprises active particles and non-fibrous binder particles, wherein the active particles and the non-fibrous binder particles are bound together at a plurality of sintered contact points, wherein the active particle comprises carbon, and wherein the porous mass has a carbon loading of at least about 6 mg/mm and an encapsulated pressure drop of about 20 mm of water or less per mm of porous mass.

18. The smoking device filter of claim 17, wherein at least some of the non-fibrous binder particles comprise at least one selected from the group consisting of: ultrahigh molecular weight polyethylene, very high molecular weight polyethylene, high molecular weight polyethylene, a polyolefin, a polyester, a polyamide, a nylon, a polyacrylic, a polystyrene, a polyvinyl, polytetrafluoroethylene, polyether ether ketone, a non-fibrous plasticized cellulose, polyethylene, polypropylene, polybutylene, polymethylpentene, low-density polyethylene, linear low-density polyethylene, high-density polyethylene, polyethylene terephthalate, polybutylene terephthalate, polycyclohexylene dimethylene terephthalate, polytrimethylene terephthalate, polyacrylics, polymethyl methacrylate, polystyrene, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, styrene-butadiene, styrene-maleic anhydride, ethylene vinyl acetate, ethylene vinyl alcohol, polyvinyl chloride, cellulose acetate, cellulose acetate butyrate, plasticized cellulose, cellulose propionate, ethyl cellulose, any derivative thereof, any copolymer thereof, and any combination thereof.

19. The smoking device filter of claim 17, wherein at least some of the non-fibrous binder particles have a melt flow index less than or equal to about 3.5 g/10min at 190°C and 15 Kg.

20. The smoking device filter of claim 17, wherein the porous mass has a void volume of about 40% to about 90%.

21. A smoking device comprising a smokeable substance in fluid communication with the smoking device filter of claim 17.

22. A smoking device filter comprising:
a porous mass that comprises a plurality of active particles and a plurality of non-fibrous binder particles, wherein the porous mass has a void

volume of about 40% to about 90%, and wherein the active particles and the non-fibrous binder particles are bound together at a plurality of sintered contact points.

23. The smoking device filter of claim 22, wherein the non-fibrous binder particles comprise a thermoplastic material.

24. The smoking device filter of claim 22, wherein at least some of the non-fibrous binder particles comprise at least one selected from the group consisting of: ultrahigh molecular weight polyethylene, very high molecular weight polyethylene, high molecular weight polyethylene, a polyolefin, a polyester, a polyamide, a nylon, a polyacrylic, a polystyrene, a polyvinyl, polytetrafluoroethylene, polyether ether ketone, a non-fibrous plasticized cellulose, polyethylene, polypropylene, polybutylene, polymethylpentene, low-density polyethylene, linear low-density polyethylene, high-density polyethylene, polyethylene terephthalate, polybutylene terephthalate, polycyclohexylene dimethylene terephthalate, polytrimethylene terephthalate, polyacrylics, polymethyl methacrylate, polystyrene, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, styrene-butadiene, styrene-maleic anhydride, ethylene vinyl acetate, ethylene vinyl alcohol, polyvinyl chloride, cellulose acetate, cellulose acetate butyrate, plasticized cellulose, cellulose propionate, ethyl cellulose, any derivative thereof, any copolymer thereof, and any combination thereof.

25. The smoking device filter of claim 22, wherein at least some of the non-fibrous binder particles have a melt flow index less than or equal to about 3.5 g/10min at 190°C and 15 Kg.

26. The smoking device filter of claim 22, wherein at least some of the non-fibrous binder particles have a particle size in at least one dimension ranging from about 0.1 nanometers to about 5000 microns.

27. The smoking device filter of claim 22, wherein the active particles comprise at least one selected from the group consisting of: activated carbon, an ion exchange resin, a desiccant, a silicate, a molecular sieve, a silica gel, activated alumina, a zeolite, perlite, sepiolite, Fuller's Earth, magnesium silicate, a metal oxide, iron oxide, activated carbon, and any combination thereof.

28. The smoking device filter of claim 22, wherein the active particles comprise at least one selected from the group consisting of: a nano-scaled carbon

particle, a carbon nanotube having at least one wall, a carbon nanohorn, a bamboo-like carbon nanostructure, a fullerene, a fullerene aggregate, graphene, a few layer graphene, oxidized graphene, an iron oxide nanoparticle, a nanoparticle, a metal nanoparticle, a gold nanoparticle, a silver nanoparticle, a metal oxide nanoparticle, an alumina nanoparticle, a magnetic nanoparticle, a paramagnetic nanoparticle, a superparamagnetic nanoparticle, a gadolinium oxide nanoparticle, a hematite nanoparticle, a magnetite nanoparticle, a gado-nanotube, an endofullerene, Gd@C60, a core-shell nanoparticle, an onionated nanoparticle, a nanoshell, an onionated iron oxide nanoparticle, and any combination thereof.

29. The smoking device filter of claim 22, wherein at least some of the active particles have a particle size in at least one dimension ranging from about 0.1 nanometers to about 5000 microns.

30. The smoking device filter of claim 22, wherein the porous mass comprises a ratio of the active particles to the binder particles ranging from about 1 wt% active particles and about 99 wt% binder particles to about 99 wt% active particles and about 1 wt% binder particles.

31. The smoking device filter of claim 22, wherein the porous mass has a carbon loading of at least about 6 mg/mm and an encapsulated pressure drop of about 20 mm of water or less per mm of porous mass.

32. The smoking device filter of claim 22, wherein the porous mass has an encapsulated pressure drop of about 0.1 to about 7 mm of water per mm length of porous mass.

33. The smoking device filter of claim 22, wherein the porous mass has an active particle loading of at least about 1 mg/mm and an encapsulated pressure drop less than about 20 mm of water per mm length of porous mass, and wherein the active particle is not carbon.

34. A smoking device comprising:
a smokeable substance, and
a filter in fluid communication with the smokeable substance, the filter comprising a porous mass that comprises a plurality of active particles and a plurality of non-fibrous binder particles, wherein the porous mass has a void

volume of about 40% to about 90%, and wherein the active particles and the non-fibrous binder particles are bound together at a plurality of sintered contact points.

35. The smoking device of claim 34, wherein the filter consists essentially of the porous mass.

36. The smoking device of claim 34, wherein the filter comprises a plurality of sections, wherein at least one section comprises the porous mass.

37. The smoking device of claim 36, wherein the filter comprises at least one section that comprises at least one element selected from the group consisting of: cellulose acetate, polypropylene, polyethylene, polyolefin tow, polypropylene tow, polyethylene terephthalate, polybutylene terephthalate, random oriented acetate, a paper, a corrugated paper, a concentric filter, a peripheral filter of fibrous tow and a core of a web material, carbon-on-tow, a Dalmatian filter, silica, magnesium silicate, a zeolite, a molecular sieve, a salt, a catalyst, sodium chloride, nylon, a flavorant, tobacco, a capsule, cellulose, a cellulosic derivative, a catalytic converter, iodine pentoxide, a coarse powder, a carbon particle, a carbon fiber, a fiber, a glass bead, a void chamber, a baffled void chamber, and any combination thereof.

38. The smoking device of claim 34, wherein the filter comprises a cavity.

39. The smoking device of claim 34, wherein at least some of the non-fibrous binder particles have a melt flow index less than or equal to about 3.5 g/10min at 190°C and 15 Kg.

40. The smoking device of claim 34, wherein the porous mass has an active particle loading of at least about 1 mg/mm and an encapsulated pressure drop less than about 20 mm of water per mm length of porous mass, and wherein the active particle is not carbon.

41. The smoking device of claim 34, wherein the porous mass has a carbon loading of at least about 6 mg/mm and an encapsulated pressure drop of about 20 mm of water or less per mm of porous mass.

Claims:

1. A smoking device filter comprising:

a porous mass that itself comprises a plurality of active particles and a plurality of non-fibrous binder particles, wherein the active particles and the non-fibrous binder particles are bound together at a plurality of sintered contact points, and

wherein the active particles comprises at least one selected from the group consisting of: a nano-scaled carbon particle, a carbon nanotube having at least one wall, a carbon nanohorn, a bamboo-like carbon nanostructure, a fullerene, a fullerene aggregate, graphene, a few layer graphene, oxidized graphene, a iron oxide nanoparticle, a nanoparticle, a metal nanoparticle, a gold nanoparticle, a silver nanoparticle, a metal oxide nanoparticle, an alumina nanoparticle, a magnetic nanoparticle, a paramagnetic nanoparticle, a superparamagnetic nanoparticle, a gadolinium oxide nanoparticle, a hematite nanoparticle, a magnetite nanoparticle, a gadonanotube, an endofullerene, Gd@C₆₀, a core-shell nanoparticle, an onionated nanoparticle, a nanoshell, an onionated iron oxide nanoparticle, and any combination thereof.

2. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles comprise a thermoplastic material.

3. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles comprise at least one selected from the group consisting of: ultrahigh molecular weight polyethylene, very high molecular weight polyethylene, high molecular weight polyethylene, a polyolefin, a polyester, a polyamide, a nylon, a polyacrylic, a polystyrene, a polyvinyl, polytetrafluoroethylene, polyether ether ketone, a non-fibrous plasticized cellulose, polyethylene, polypropylene, polybutylene, polymethylpentene, low-density polyethylene, linear low-density polyethylene, high-density polyethylene, polyethylene terephthalate, polybutylene terephthalate, polycyclohexylene dimethylene terephthalate, polytrimethylene terephthalate, polyacrylics, polymethyl methacrylate, polystyrene, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, styrene-butadiene, styrene-maleic anhydride, ethylene vinyl

acetate, ethylene vinyl alcohol, polyvinyl chloride, cellulose acetate, cellulose acetate butyrate, plasticized cellulose, cellulose propionate, ethyl cellulose, any derivative thereof, any copolymer thereof, and any combination thereof.

4. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles have a melt flow index less than or equal to 3.5 g/10min at 190°C and 15 Kg.

5. The smoking device filter of claim 1, wherein at least some of the non-fibrous binder particles have a particle size in at least one dimension ranging from 0.1 nanometers to 5000 microns.

6. The smoking device filter of claim 1, wherein the porous mass has a void volume of 40% to 90%.

7. The smoking device filter of claim 1, wherein the porous mass comprises a ratio of the active particles to the binder particles ranging from 1 wt% active particles and 99 wt% binder particles to 99 wt% active particles and 1 wt% binder particles.

8. The smoking device filter of claim 1, wherein the porous mass has an encapsulated pressure drop of 0.1 to 20 mm of water per mm length of porous mass.

9. A smoking device comprising a smokeable substance in fluid communication with the smoking device filter of claim 1.