Claims

1. An iron-iron oxide composition, comprising:
   a) a cashew testa extract; and
   b) iron-iron oxide core-shell particles, the core is an elemental iron core or an iron alloy core, and the shell is an iron oxide shell;
   wherein the cashew testa extract comprises a component selected from protein, amino acid, sugar, phenolic compounds or a combination thereof, the phenolic compounds selected from tannins, catechin, epicatechin, epigallocatechin, p-coumaric, gallic acid, or a combination thereof; and
   wherein the iron-iron oxide particles are at least partially passivated by the protein, amino acid, sugar, phenolic compounds, or a combination thereof.

2. The iron-iron oxide composition according to claim 1, wherein the iron-iron oxide particles are further at least partially passivated by a carboxylate acid moiety or a hydroxyl moiety.

3. The iron-iron oxide composition according to claim 1 or 2, wherein the iron-iron oxide particles have an average particle size of 1 μm to 800 μm.

4. The iron-iron oxide composition according to any one of claims 1 to 3, wherein the shell further comprises a component from cashew testa extract.

5. The iron-iron oxide composition according to claim 1 or 4, wherein the shell has a thickness of 5 nm to 1 μm.

6. A method of synthesising an iron-iron oxide composition, comprising:
   reacting a cashew testa extract with iron particles and an iron oxide precursor in order to form iron-iron oxide core-shell particles;
   wherein the iron-iron oxide core-shell particles has an elemental iron core or an iron alloy core, and an iron oxide shell;
   wherein the cashew testa extract comprises a component selected from protein, amino acid, sugar, phenolic compounds or a combination thereof; and
   wherein the iron particles and/or iron oxide particles are at least partially passivated by a component of the cashew testa extract.

7. The method according to claim 6, wherein the iron oxide precursor is an iron (III) salt.

8. The method according to claim 6 or 7, wherein the cashew testa extract comprises phenolic compounds and a weight ratio of the phenolic compounds to iron particles and iron oxide precursor is 1:500 to 500:1.

9. A method of disinfecting a non-biological surface, comprising:
   a) contacting an iron-iron oxide composition according to any one of claims 1 to 5 with the non-biological surface.

10. The method according to claim 9, further comprising a step prior to (a) of applying the iron-iron oxide composition to an application medium.

11. A method of killing microbial in the dark by using an iron-iron oxide composition according to any one of claims 1 to 5.

12. A method of disinfecting a surface using iron-iron oxide composition according to any one of claims 1 to 5, wherein the iron-iron oxide composition provides at least a 2 log reduction in microbial activity after 5 min.

13. A composite material, comprising a porous fabric impregnated with an iron-iron oxide composition according to any one of claims 1 to 5 and coated with a water repellent coating on at least one side of the porous fabric,
wherein the iron-iron oxide composition is present at 0.1% w/w to 5% w/w relative to the composite material; and
wherein the water repellent coating has a thickness of 10 µm to 500 µm.

14. A method of manufacturing a composite material, comprising:
a) impregnating a porous fabric with an iron-iron oxide composition according to any one of claims 1 to 5; and
b) coating the porous fabric with a water repellent coating on at least one side of the porous fabric in order to form the composite material,
wherein the iron-iron oxide composition is present relative to the composite material at 0.1% w/w to 5% w/w;
wherein the water repellent coating has a thickness of 10 µm to 500 µm.

15. A face mask comprising:
a) a face covering structure configured to cover at least a mouth and nasal passages of a user; and
b) an attachment structure comprising:
i) a drawstring attached to opposed sides of the face covering structure, for securing the face covering structure to a face of the user; and
ii) a fastener releasably attached to the drawstring to maintain the drawstring in a tightened or loosened position;
wherein the drawstring is arranged to form ear straps for looping behind respective ears of the user and a neck strap for looping behind a neck of the user;
wherein the fastener is attached to the neck strap; and
wherein the face covering structure comprises a composite material according to claim 13.

16. The face mask according to claim 15, wherein the fastener is a cord lock and the drawstring is threaded through eyelets of the cord lock.

17. The face mask according to claim 15 or claim 16, wherein each ear strap comprises a section of the drawstring that is attached at a first point on one of the opposed sides, and is threaded through an attachment loop at a second point that is spaced from the first point.

18. The face mask according to any one of claims 15 to 17, wherein the face covering structure comprises a filter layer, wherein the filter layer is sandwiched between an outer fabric layer and an inner fabric layer, wherein the outer fabric layer is a composite material according to claim 13.

19. The face mask according to any one of claims 15 to 18, wherein the face covering structure is configured to at least partially cover a submental triangle of the user.

20. The face mask according to any one of claims 15 to 19, wherein the face covering structure is configured to at least partially cover a zygomatic region of the user.