Claims

1. An ionizing radiation shielding panel comprising:

a core layer comprising a radiation attenuating material,

a first layer on a first side of the core layer, comprising a permeable reinforcement structure,

a second layer on a second side of the core layer, opposite to the first side, comprising a permeable reinforcement structure;

wherein the first layer, second layer and core layer are permeated with a binder.

2. The ionizing radiation shielding panel according to claim 1 wherein the permeable reinforcement structure of the first or second layers is a fabric and comprises glass fibre, or metal filaments, or carbon fibre, or poly-paraphenylene terephthalamide.

3. The ionizing radiation shielding panel according to claim 1 wherein the permeable reinforcement structure of the first layer or second layer, or both the first layer and the second layer comprises a woven fibre cloth, randomly orientated chopped fibre strands, or continuous filaments arranged in a mat, or an array of filaments.

4. The ionizing radiation shielding panel according to claim 1 wherein the first layer or second layer, or both the first layer and the second layer, comprises two or more sheets of the permeable reinforcement structure.

5. The ionizing radiation shielding panel according to claim 1 wherein the first layer or the second layer, or both the first layer and the second layer, comprises a binder spreader layer.

6. The ionizing radiation shielding panel according to claim 5 wherein the binder spreader layer is positioned between the permeable reinforcement structure and the core layer, and wherein the first layer or the second layer, or both the first layer and the second layer, further comprises a second permeable reinforcement structure positioned between the binder spreader layer and the core layer.

7. The ionizing radiation shielding panel according to claim 1 wherein the radiation attenuating material comprises greater than 65 % of the binder permeated core layer by volume.

8. The ionizing radiation shielding panel according to claim 1 wherein the radiation attenuating material comprises an element having an atomic mass greater than 47 unified atomic mass units.

9. The ionizing radiation shielding panel according to claim 1 wherein the radiation attenuating material is barite.

10. The ionizing radiation shielding panel according to claim 1, wherein the radiation attenuating material is a particulate, and a diameter of a largest particle of the radiation attenuating material is not more than 10% of the thickness of core layer.

11. The ionizing radiation shielding panel according to claim 1 further comprising a mechanical load distribution structure.

12. The ionizing radiation shielding panel according to claim 11, wherein the mechanical load distribution structure comprises a metal sheet.

13. The ionizing radiation shielding panel according to claim 11 ~~or 12~~, wherein the mechanical load distribution structure is embedded in the binder.

14. The ionizing radiation shielding panel according to claim 11 ~~or 12~~, wherein the mechanical load distribution structure forms an external layer of the ionizing radiation shielding panel and is adhered to the binder.

15. An enclosure comprising a plurality of ionizing radiation shielding panels according to claim 1.

16. The enclosure according to claim 15, wherein the plurality of ionizing radiation shielding panels comprise one or more features that allow a labyrinth to be formed at a junction of at least two of the plurality of ionizing radiation shielding panels.

17. The ionizing radiation shielding panel according to claim 1, wherein at least one of the first layer and the second layer comprises a binder spreader layer, wherein the binder spreader layer is positioned between the permeable reinforcement structure of the first layer and the core layer and the permeable reinforcement structure of the second layer is positioned between the binder spreader layer and the core layer, and wherein the binder comprises a resin and permeates the binder spreader layer.

18. The ionizing radiation shielding panel according to claim 1, wherein at least one of the first layer and the second layer comprise a binder spreader layer positioned between a first mat of fibre strand and a second mat of fibre strand and the binder spreader layer comprises a resin that permeates the binder spreader layer.

19. An ionizing radiation shielding panel comprising:

a core layer comprising a radiation attenuating material,

a first layer on a first side of the core layer, comprising a permeable reinforcement structure; and

a second layer on a second side of the core layer, opposite to the first side, comprising a permeable reinforcement structure,

wherein the first layer, second layer and core layer are permeated with a binder,

wherein at least one of the first layer and the second layer comprises a binder spreader layer and a second permeable reinforcement structure,

wherein the binder spreader layer is positioned between the permeable reinforcement structure of the first layer and the core layer and the permeable reinforcement structure of the second layer is positioned between the binder spreader layer and the core layer, and

wherein the binder comprises a resin and permeates the binder spreader layer.

20. The ionizing radiation shielding panel according to claim 19 wherein the permeable reinforcement structure of the first or second layers is a fabric and comprises glass fibre, or metal filaments, or carbon fibre, or poly-paraphenylene terephthalamide.

21. The ionizing radiation shielding panel according to claim 19 wherein the permeable reinforcement structure of the first layer or second layer, or both the first layer and the second layer comprises a woven fibre cloth, randomly orientated chopped fibre strands, or continuous filaments arranged in a mat, or an array of filaments.

22. The ionizing radiation shielding panel according to claim 19 wherein the first layer or second layer, or both the first layer and the second layer, comprises two or more sheets of the permeable reinforcement structure.

23. The ionizing radiation shielding panel according to claim 19 wherein the first layer or the second layer, or both the first layer and the second layer, comprises a binder spreader layer.

24. The ionizing radiation shielding panel according to claim 23 wherein the binder spreader layer is positioned between the permeable reinforcement structure and the core layer, and wherein the first layer or the second layer, or both the first layer and the

second layer, further comprises a second permeable reinforcement structure positioned between the binder spreader layer and the core layer.

25. An ionizing radiation shielding panel comprising:

a core layer comprising a radiation attenuating material,

a first layer on a first side of the core layer, comprising a permeable reinforcement structure; and

a second layer on a second side of the core layer, opposite to the first side, comprising a permeable reinforcement structure,

wherein the first layer, second layer and core layer are permeated with a binder, and

wherein at least one of the first layer and the second layer comprise a binder spreader layer positioned between a first mat of fibre strand and a second mat of fibre strand and the binder spreader layer comprises a resin that permeates the binder spreader layer.

26. The ionizing radiation shielding panel according to claim 25 wherein the permeable reinforcement structure of the first or second layers is a fabric and comprises glass fibre, or metal filaments, or carbon fibre, or poly-paraphenylene terephthalamide.

27. The ionizing radiation shielding panel according to claim 25 wherein the permeable reinforcement structure of the first layer or second layer, or both the first layer and the second layer comprises a woven fibre cloth, randomly orientated chopped fibre strands, or continuous filaments arranged in a mat, or an array of filaments.

28. The ionizing radiation shielding panel according to claim 25 wherein the first layer or second layer, or both the first layer and the second layer, comprises two or more sheets of the permeable reinforcement structure.

29. The ionizing radiation shielding panel according to claim 25 wherein the first layer or the second layer, or both the first layer and the second layer, comprises a binder spreader layer.

30. The ionizing radiation shielding panel according to claim 29 wherein the binder spreader layer is positioned between the permeable reinforcement structure and the core layer, and wherein the first layer or the second layer, or both the first layer and the second layer, further comprises a second permeable reinforcement structure positioned between the binder spreader layer and the core layer.