CLAIMS

1. A method for making a silica fiber composition, comprising:

preparing a sol that contains 70% to 90% tetraethyl orthosilicate (TEOS) by weight, 8% to 25% ethanol by weight, an acid catalyst, and the balance water;

transitioning the sol to a sol-gel for 2 to 7 days under conditions where humidity is within the range of 40% to 80%, and the temperature is within the range of 50 to 90° F; and

electrospinning the sol-gel into a silica fiber mat.

2. The method of claim 1, wherein the sol is not exposed to heat over 150° F.

3. The method of claim 2, wherein the sol is not exposed to heat over 100° F.

4. The method of claim 1, wherein the sol contains 75% to 85% by weight TEOS, 15% to 20% by weight ethanol, and 2% to 5% by weight water.

5. The method of claim 1, wherein the sol contains 70% to 90% by weight TEOS, 8% to 25% by weight ethanol, and 1% to 10% by weight water.

6. The method of claim 1, wherein the acid catalyst is HCl.

7. The method of claim 1, wherein the sol contains less than about 0.1% by weight of the acid catalyst.

8. The method of claim 7, wherein the sol contains from 0.02% to 0.08% by weight of the acid catalyst.

9. The method of claim 1, wherein the sol does not contain an organic polymer.

10. The method of claim 1, where the composition consists essentially of SiO_2.

11. The method of claim 1, wherein the sol is allowed to transition for 2 to 4 days.

12. The method of claim 11, wherein the sol is allowed to transition for about 3 days.

13. The method of claim 1, wherein the humidity is 50 to 70%.

14. The method of claim 13, wherein the temperature is 60 to 80° F.

15. The method of claim 1, wherein the conditions further comprise a fan exhausting gases from the sol.

16. The method of claim 1, wherein the sol-gel is electrospun when the weight is at from 20% to 40% of the starting weight of the sol.

17. The method of claim 1, wherein the sol-gel is electrospun when the production of ethylene vapor is 10% to 20% relative to the peak production of ethylene vapors from the sol.

18. The method of claim 1, wherein the mat has a thickness of at least about 1/8 inch.

19. The method of claim 18, wherein the mat has a thickness of at least about 1/4 inch.

20. The method of claim 1, further comprising combining at least a portion of the silica fiber mat with a liquid or gelatinous composition.

21. The method of claim 20, wherein the liquid or gelatinous composition comprises a paint, an epoxy, a urethane, or an adhesive.

22. The method of claim 20, wherein the at least a portion of the silica fiber mat is processed into a plurality of fragments or a powder for combination with the liquid or gelatinous composition, whereby a modified composition is formed.

23. The method of claim 22, further comprising applying the modified composition as a coating to a solid object or a fabric.

24. The method of claim 22, further comprising molding the modified composition into a solid object.

25. A silica fiber mat composition, comprising silica fibers prepared by electrospinning a sol-gel prepared with tetraethyl orthosilicate (TEOS), an alcohol solvent, and acid catalyst, the sol-gel having been allowed to transition for at least 2 days under conditions where humidity is within the range of about 40% to about 80%, and the temperature is within the range of 50º F to 90º F.

26. The composition of claim 25, wherein the sol-gel is electrospun when the weight is at from 20% to 40% of the starting weight before transitioning.

27. The composition of claim 25, wherein the sol-gel is electrospun when the production of ethylene vapor therefrom is 10% to 40% relative to the sol-gel before transitioning.

28. The composition of claim 25, wherein the fibers have a diameter of from about 50 nm to about 5 μm.

29. The composition of claim 25, wherein the fibers have a variable diameter of from about 200 nm to about 1000 nm.

30. The composition of claim 25, wherein the composition consists essentially of SiO_2.

31. The composition of claim 25, wherein the sol-gel is prepared with 70% to 90% TEOS by weight, 8% to 25% ethanol by weight, an acid catalyst, and the balance water.

32. The composition of claim 25, further comprising a topical carrier.

33. The composition of claim 32, wherein the topical carrier is a lotion, ointment, paste, cream, foam, or gel.

34. The composition of claim 32, wherein the topical carrier further comprises one or more pharmaceutical or antimicrobial agents.

35. The composition of claim 32, wherein the topical carrier comprises an antibiotic or antiseptic.

36. The composition of claim 32, wherein the topical carrier comprises an anti-inflammatory agent or immunosuppressant