Claims

1. A crosslinkable polymer composite comprising 100 parts by weight of a silane-grafted thermoplastic polymer blend formed from silane grafting a polymer blend, which includes ethylene/alpha-olefin plastomer and thermoplastic polyethylene; and 75 to 150 parts by weight precipitated magnesium hydroxide as a flame retardant.

2. The crosslinkable polymer composite of claim 1 comprising 40 to 50 wt.% of the silane-grafted thermoplastic polymer blend; and 45 to 60 wt.% of the precipitated metal hydroxide.

3. The crosslinkable polymer composite of claim 1, wherein the precipitated magnesium hydroxide has a d_{50} of 0.5 - 2 microns, a BET of 1 - 15 m^2/g and/or a bulk density of 300 - 600 g/L.

4. The crosslinkable polymer composite of claim 3, wherein the silane-grafted thermoplastic polymer blend includes 40 to 60 wt.% silane-grafted ethylene/alpha-olefin plastomer and 40 to 60 wt.% silane-grafted polyethylene.

5. The crosslinkable polymer composite of claim 3, wherein the silane-grafted polymer blend is formed by reacting a mixture which includes the ethylene/alpha-olefin plastomer, the thermoplastic polyethylene, vinyl alkoxysilane and a free radical initiator; and the composite is formed by compounding the silane-grafted polymer blend with the precipitated magnesium hydroxide flame retardant and other optional additives to provide a compounded mixture; and extruding the compounded mixture to form a halogen free, flame-retardant, crosslinkable polymer composite.

6. The crosslinkable polymer composite of claim 1, wherein the ethylene/alpha-olefin plastomer has an MFI at 190 °C of 1-5 g/10 min (as determined pursuant to ISO 1133); and the polyethylene has an MFI at 190 °C of ~~about~~ 1-5 g/10 min (as determined pursuant to ISO 1133).

7. The crosslinkable polymer composite of claim 6, wherein the ethylene/alpha-olefin plastomer is an ethylene/1-octene plastomer having a melting temperature of 70 to 80 °C (as

determined pursuant to ISO 11357) and/or a Shore D Hardness of no more than 30 (as determined pursuant to ISO 868).

8. The crosslinkable polymer composite of claim 6, wherein the polyethylene is a linear low density polyethylene having a melting temperature of 120 to 130 °C, and a density of 0.91 to 0.93 g/cm^3.

9. The crosslinkable polymer composite of claim 1, wherein the polymer blend comprises 40 to 60 wt.% of the ethylene/alpha-olefin plastomer and 40 to 60 wt.% of a linear low density polyethylene.

10. The crosslinkable polymer composite of claim 1, wherein the composite comprises 40 to 50 wt.% of the silane-grafted thermoplastic polymer blend; and 45 to 60 wt.% of the precipitated magnesium hydroxide;

wherein the polymer blend comprises 40 to 60 wt.% of the ethylene/alpha-olefin plastomer, which comprises a ethylene/1-octene plastomer having an MFI of 1-5 g/10 min (as determined pursuant to ISO 1133); and 40 to 60 wt.% of a linear low density polyethylene having an MFI at 190 °C of 1 to 5 g/10 min (as determined pursuant to ISO 1133) and a density of 0.91 to 0.93 g/cm^3.

11. The crosslinkable polymer composite of claim 10, wherein an insulation material formed from the crosslinkable polymer composite has an elongation before aging of at least 150% (as determined pursuant to UL 44 Clause 4.2 & UL 44, Table 11); a tensile strength before aging of at least 10 MPa (1500 lbf/in^2) (as determined pursuant to UL 44 Clause 4.2 & UL 44, Table 11); and maintains long term insulation resistance after being exposed to water at 90 °C for at least 24 weeks (as determined pursuant to UL 44 Clause 5.4).

12. A halogen-free, crosslinkable polymer composite comprising:

40 to 50 wt.% of a polymer component including silane-grafted ethylene/alpha-olefin plastomer and/or silane-grafted thermoplastic polyethylene; and optionally, includes ethylene/alpha-olefin plastomer and/or thermoplastic polyethylene; and

45 to 60 wt.% precipitated magnesium hydroxide having average particle size of no more than 2 microns.

13. The crosslinkable polymer composite of claim 12, wherein the polymer component comprises one or more of a silane-grafted ethylene/1-octene plastomer and a silane-grafted linear low density polyethylene.

14. The crosslinkable polymer composite of claim 12, wherein the polymer component comprises 40 to 60 wt.% silane-grafted ethylene/1-octene plastomer and 40 to 60 wt.% silane-grafted linear low density polyethylene.

15. The crosslinkable polymer composite of claim 12, wherein an insulation material formed from the crosslinkable polymer composite has a tensile strength before aging of at least 10 MPa (1500 lbf/in^2) (as determined pursuant to UL 44 Clause 4.2 & UL 44, Table 11).

16. The crosslinkable polymer composite of claim 12, wherein an insulation material formed from the crosslinkable polymer composite has an elongation before aging of at least 150% (as determined pursuant to UL 44 Clause 4.2 & UL 44, Table 11).

17. The crosslinkable polymer composite of claim 12, wherein an insulation material formed from the crosslinkable polymer composite maintains long term insulation resistance after being exposed to water at 90 °C for at least 24 weeks (as determined pursuant to UL 44 Clause 5.4).

18. A halogen-free, crosslinkable polymer composite comprising 40 to 60 wt.% of a silane-grafted thermoplastic polymer blend; and 40 to 60 wt.% precipitated magnesium hydroxide;

wherein the silane-grafted thermoplastic polymer blend is formed from silane grafting a polymer blend, the polymer blend including 40 to 60 wt.% ethylene/1-octene plastomer and 40 to 60 wt.% linear low density polyethylene; and

the precipitated magnesium hydroxide comprises 40 to 75 wt.% of a first precipitated magnesium hydroxide having a d_{50} of 1.5 - 2 microns and a BET of 2 - 5 m^2/g; and 25 to 60 wt.% of a second precipitated magnesium hydroxide having a d_{50} of 0.7 - 1.2 microns and a BET of 8 - 12 m^2/g.

19. The crosslinkable polymer composite of claim 18, wherein the ethylene/1-octene plastomer has an MFI at 190 °C of 1-5 g/10 min and a melting temperature of 70 to 80 °C; and

the linear low density polyethylene has a melting temperature of 120 to 130 °C and an MFI at 190 °C of 1-5 g/10 min.

20. The crosslinkable polymer composite of claim 19, wherein an insulation material formed from the crosslinkable polymer composite has an elongation before aging of at least 150% (as determined pursuant to UL 44 Clause 4.2 & UL 44, Table 11); a tensile strength before aging of at least 10 MPa (1500 lbf/in^2) (as determined pursuant to UL 44 Clause 4.2 & UL 44, Table 11); and maintains long term insulation resistance after being exposed to water at 90 °C for at least 24 weeks (as determined pursuant to UL 44 Clause 5.4).

21. The crosslinkable polymer composite of claim 1 further comprising a metal hydroxide flame retardant selected from calcium, zinc or aluminum hydroxide or mixtures thereof.