Claims

1. A thermosetting composition comprising:

a poly(1,4-phenylene ether) component having at least 80% phenylene ether content, the poly(1,4-phenylene ether) component being a poly(1,4-phenylene ether) bis(meth)acrylate component, a bis(vinyl) poly(1,4-phenylene ether) component, or a bis((meth)allyl) poly(1,4-phenylene ether) component, or a combination of two or more thereof, in an amount in the range of 20-35 wt%;

an aromatic crosslinking component having a weight average molecular weight of no greater than 700 g/mol and bearing on numerical average in the range of 1.75 - 3.5 crosslinkable vinyl, (meth)allyl and/or (meth)acrylate groups per molecule, in an amount in the range of 2-15 wt%;

a butadiene/styrene copolymeric rubber component, in an amount of 5-25 wt%;

microparticulate silica, in an amount in the range of 15-50 wt%;

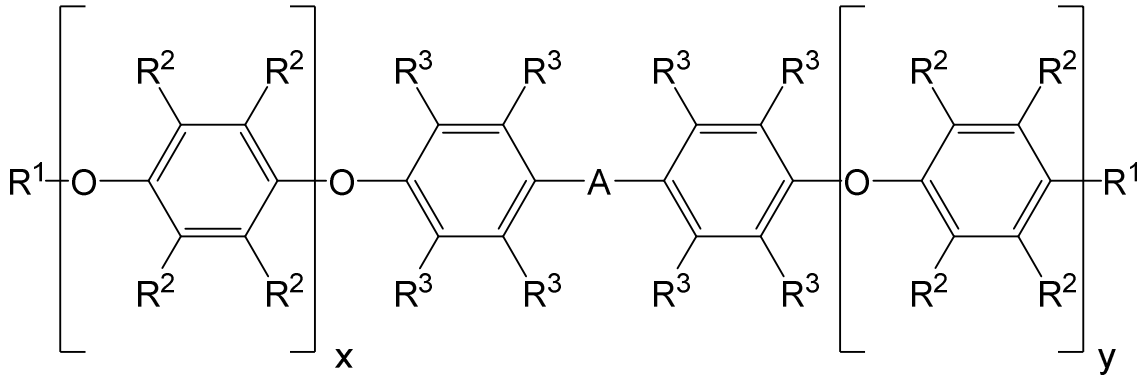
an organic halogen-free fire retardant component, in an amount of 15-35 wt%; and

a thermal free-radical initiator component, in an amount of 0.1-3 wt%.

2. The thermosetting composition of claim 1, wherein the mass of the (optionally-substituted phenylene) groups of the -O-(optionally-substituted phenylene) content of the poly(1,4-phenylene ether) component is made up of at least 50% phenyl carbons and phenyl hydrogens.

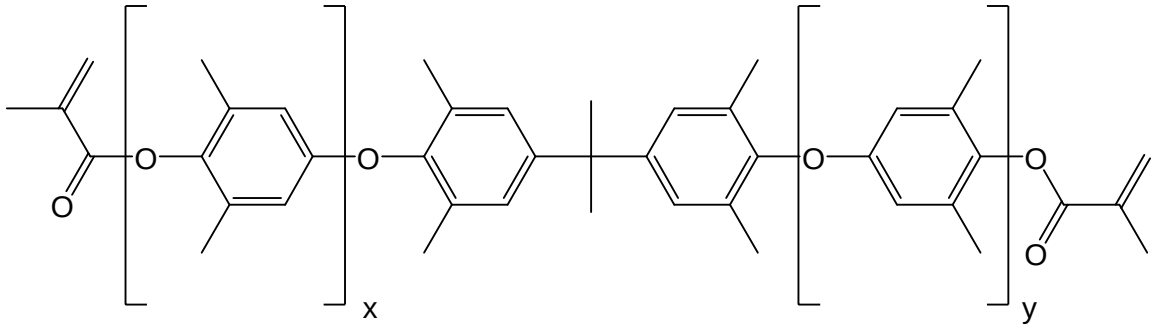
3. The thermosetting composition of claim 1 or claim 2, wherein the poly(1,4-phenylene ether) bis(meth)acrylate component is a poly(1,4-phenylene ether) bismethacrylate component, i.e., having at least 75 wt%, e.g., at least 90 wt% poly(1,4-phenylene ether) bismethacrylate.

4. The thermosetting composition of any of claims 1-3, wherein the poly(1,4-phenylene ether) component has the formula



wherein A is a bond, $-CH_2-$, $CH(CH_3)-$, $-C(CH_3)_2-$, -O-, -C(O)-, S(O), or $S(O)_2$; each R^1 is independently methacrylate, acrylate, vinyl, allyl or methallyl; each R^2 is independently methyl or hydrogen; and each R^3 is independently methyl or hydrogen.

5. The thermosetting composition of claim 4 wherein at least 75 wt%, e.g., at least 90 wt% or at least 95 wt%, of the poly(1,4-phenylene ether) component has the formula



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6. The thermosetting composition of any of claims 1-5, wherein the poly(1,4-phenylene ether) component is present in an amount of 25-35 wt%.

7. The thermosetting composition of any of claims 1-6, wherein the aromatic crosslinking component is a cyanurate component that is triallylcyanurate, triallylisocanurate, or a combination of triallylcyanurate and triallylisocanurate.

8. The thermosetting composition of any of claims 1-7, wherein the butadiene/styrene copolymeric rubber component has a total content of butadiene and styrene residues in an amount of at least 95 wt%, and/or wherein the butadiene/styrene copolymeric rubber component has in the range of 23-40 wt% styrene residues.

9. The thermosetting composition of any of claims 1-8, wherein the butadiene/styrene copolymeric rubber component has a substantially random arrangement of butadiene and styrene.

10. The thermosetting composition of any of claims 1-9, wherein the butadiene/styrene copolymeric rubber component has a number average molecular weight in the range of 1500-7000 g/mol.

11. The thermosetting composition of any of claims 1-10, wherein the butadiene residues of the butadiene/styrene copolymeric rubber component have a molar fraction of 1,2-vinyl moieties in the range of 15-80 mol%.

12. The thermosetting composition of any of claims 1-11, wherein the butadiene/styrene copolymeric rubber component is made up of a first butadiene/styrene substantially random copolymeric rubber subcomponent that has 17-27 wt% styrene residues and in which the butadiene residues have a molar fraction of 1,2-vinyl moieties of 60-80 mol%; and a second butadiene/styrene substantially random copolymeric rubber subcomponent that has 20-30 wt% styrene residues and in which the butadiene residues have a molar fraction of 1,2-vinyl moieties of 20-40 mol%, wherein a weight ratio of the first butadiene/styrene substantially random copolymeric rubber subcomponent and the second butadiene/styrene substantially random copolymeric rubber subcomponent is in the range of 1:1.2 – 1:2.3.

13. A cured product of a thermosetting composition according to any of claims 1-12.

14. A prepreg comprising a mesh substrate at least partially embedded in a cured product of claim 13.

15. A laminate of a plurality of prepregs according to claim 14, having

a peel strength of at least 2.5 lb/in as measured by IPC-TM-650 2.4.8;

a Df value of in the range of 0.0015 to 0.003, as measured by IPC-TM-650 2.5.5.5; and

a Tg as measured by DSC in the range of 180-240 °C.