

CLAIMS

1. An isobutylene-based polymer composition comprising:
(a) an isobutylene-based functionalized polymer; and
(b) one of or a combination of any of the following:
 - 5 (i) a sulfur donor;
 - (ii) a blend of sulfur and a sulfur donor; and
 - (iii) an accelerator cure system.
2. The isobutylene-based polymer composition of claim 1, wherein the isobutylene-based
10 functionalized polymer is a modified poly(isobutylene-co-para-methylstyrene) amine-ionomer, wherein the amine ionomer is selected from the group consisting of 1°, 2°, and 3° amine nucleophiles with one or more pendant vinyl groups.
3. The isobutylene-based polymer composition of claim 2, wherein the amount of the
15 amine ionomer present in the functionalized polymer is about 0.5 wt % to about 50 wt % based on the total weight of the functionalized polymer.
4. The isobutylene-based polymer composition of claim 1, wherein the isobutylene-based
functionalized polymer is a modified poly(isobutylene-co-para-methylstyrene)-phosphine
20 ionomer, wherein the phosphine ionomer is selected from diphenylphosphinostyrene, allyldiphenylphosphine, diallylphenylphosphine, diphenylvinylphosphine, triallylphosphine, and combinations thereof.
5. The isobutylene-based polymer composition of claim 4, wherein the amount of the
25 phosphine ionomer present in the functionalized polymer is about 0.5 wt % to about 50 wt % based on the total weight of the functionalized polymer.
6. The isobutylene-based polymer composition of any preceding claim, further
comprising at least one filler.
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7. The isobutylene-based polymer composition of any preceding claim, wherein the sulfur donor is selected from the group consisting of tetramethyl thiuram disulfide ("TMTD"), 4,4'-dithiodimorpholine, dipentamethylene thiuram tetrasulfide ("DPTT"), and thiocarbamyl sulfonamide.

8. The isobutylene-based polymer composition of any preceding claim, wherein the accelerator cure system comprises one or more of thiazoles, amines, guanidines, sulfenamides, thiurams, dithiocarbamates, and/or zanthates.
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9. The isobutylene-based polymer composition of claim 8, wherein the accelerator cure system is N-cyclohexyl-2-benzothiazole sulfenamide ("CBS") or diphenylguanidine ("DPG").
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10. The isobutylene-based polymer composition of claims 6-9, wherein the filler is selected from the group of carbon black, white filler, and combinations thereof.
11. The isobutylene-based polymer composition of any preceding claim, wherein the composition is useful as a thermoset in pharmaceutical and tire applications.
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12. A thermoset composition comprising:
- (a) an isobutylene-based functionalized polymer; and
 - (b) one of or a combination of any of the following:
 - (i) a sulfur donor;
 - 20 (ii) a blend of sulfur and a sulfur donor; and
 - (iii) an accelerator cure system;
- wherein the composition is substantially free of zinc.
13. The thermoset composition of claim 12, wherein the isobutylene-based functionalized
- 25 polymer is a modified poly(isobutylene-co-para-methylstyrene) amine-ionomer, wherein the amine ionomer is selected from the group consisting of 1°, 2°, and 3° amine nucleophiles with one or more pendant vinyl groups.
14. The thermoset composition of claim 13, wherein the amount of the amine ionomer
- 30 present in the functionalized polymer is about 0.5 wt % to about 50 wt % based on the total weight of the functionalized polymer.
15. The thermoset composition of claim 12, wherein the isobutylene-based functionalized polymer is a modified poly(isobutylene-co-para-methylstyrene)-phosphine ionomer, wherein

the phosphine ionomer is selected from diphenylphosphinostyrene, allyldiphenylphosphine, diallylphenylphosphine, diphenylvinylphosphine, triallylphosphine, and combinations thereof.

- 5 16. The thermoset composition of claim 15, wherein the amount of the phosphine ionomer present in the functionalized polymer is about 0.5 wt % to about 50 wt % based on the total weight of the functionalized polymer.
- 10 17. The thermoset composition of claims 12-16, further comprising at least one filler.
18. The thermoset composition of claims 12-17, wherein the sulfur donor is selected from the group consisting of tetramethyl thiuram disulfide ("TMTD"), 4,4'-dithiodimorpholine, dipentamethylene thiuram tetrasulfide ("DPTT"), and thiocarbamyl sulfonamide.
- 15 19. The thermoset composition of claims 12-18, wherein the accelerator cure system comprises one or more of thiazoles, amines, guanidines, sulfenamides, thiurams, dithiocarbamates, and/or zanthates.
- 20 20. The thermoset composition of claim 19, wherein the accelerator cure system is N-cyclohexyl-2-benzothiazole sulfenamide ("CBS") or diphenylguanidine ("DPG").
21. The thermoset composition of claims 17-20, wherein the filler is selected from the group of carbon black, white filler, and combinations thereof.
- 25 22. A rubber composition comprising the thermoset composition of claims 12-21.
23. The rubber composition of claim 22 further comprising a hydrocarbon resin.
24. An article comprising the rubber composition of claims 22-23.