CLAIMS

1. A flame retardant polyolefin formulation comprising a polymer, a polyolefin matrix and an inorganic flame retardant, wherein the polymer has a backbone and a side unit of 9,10-dihydro-9-oxa-10-phosphaphenanthrene 10-oxide bonded thereto, wherein the backbone of the polymer comprises at least one heterocyclic moiety.

2. The flame retardant polyolefin formulation of claim 1, wherein at least one heteroatom of the at least one heterocyclic moiety is selected from a group 15 element of the periodic table.

3. The flame retardant polyolefin formulation of claim 2, wherein the polymer comprises at least 2 heteroatoms selected from the group 15 element of the periodic table in each repeating unit of the polymer.

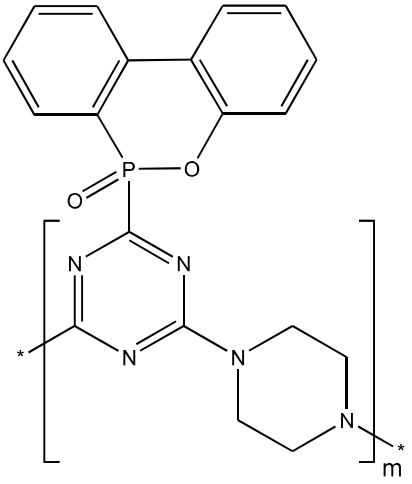
4. The flame retardant polyolefin formulation of claim 2 or claim 3, wherein the at least one heteroatom of the at least one heterocyclic moiety is nitrogen.

5. The flame retardant polyolefin formulation of claim 2 or claim 3, wherein the at least one heteroatom of the at least one heterocyclic moiety is phosphorous.

6. The flame retardant polyolefin formulation of any one of claims 1 to 5, wherein the at least one heterocyclic moiety is selected from one or more of the group consisting of piperidinyl, pyridinyl, phosphaninyl, phosphininyl, diazinanyl, diazinyl, morpholinyl, oxazinyl, thiomorpholinyl, thiazinyl, triazinanyl, triazinyl, tetrazinyl, pentazinyl, cyclic 1,3-propanediol phosphoryl, and a combination thereof.

7. The flame retardant polyolefin formulation of claim 6, wherein the diazinanyl is selected from the group consisting of 1,2-diazinanyl, 1,3-diazinanyl, 1,4-diazinanyl (piperazinyl), and a combination thereof.

8. The flame retardant polyolefin formulation of any one of claims 1 to 4, 6 and 7, the polymer having the formula (I)

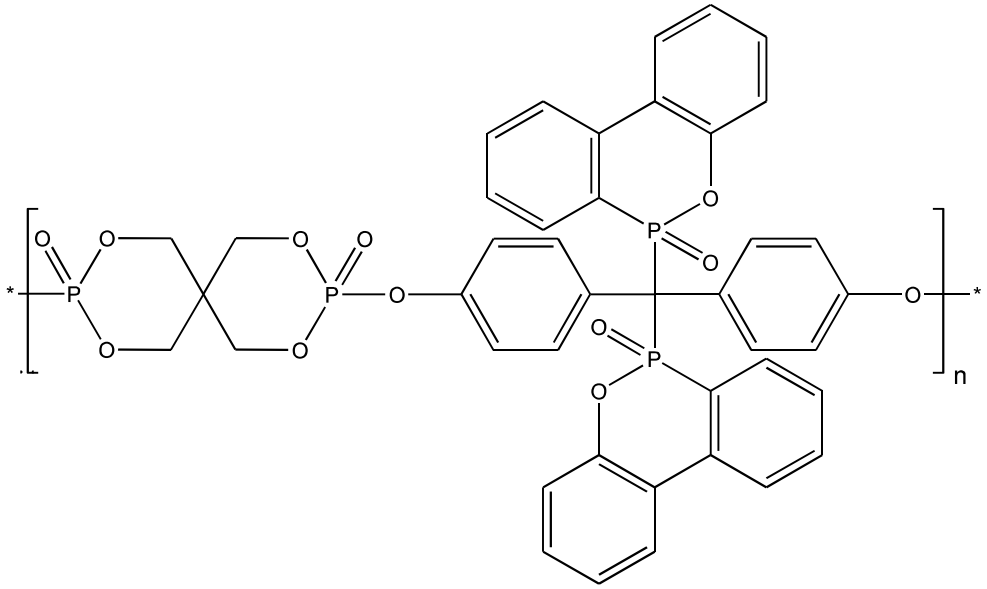


(I),

wherein m is an integer number ranging from 2 to 5000; and

* represents an attachment point.

9. The flame retardant polyolefin formulation of any one of claims 1 to 3 and 5, the polymer having the formula (II)



(II),

wherein n is an integer number ranging from 2 to 1000; and

* represents an attachment point.

10. The flame retardant polyolefin formulation of any one of the preceding claims, wherein the polyolefin matrix is present in a weight percentage range of about 20 wt% to about 90 wt%.

11. The flame retardant polyolefin formulation of any one of the preceding claims, wherein the polyolefin matrix further comprises polypropylene having an anhydride grafted thereon.

12. The flame retardant polyolefin formulation of any one of the preceding claims, wherein the inorganic flame retardant is coated with a nitrogen-containing heterocyclic compound.

13. The flame retardant polyolefin formulation of claim 12, wherein the nitrogen-containing heterocyclic compound is melamine.

14. The flame retardant polyolefin formulation of any one of the preceding claims, wherein the inorganic flame retardant is a polymeric salt.

15. The flame retardant polyolefin formulation of any one of the preceding claims, wherein the polymer is blended with the inorganic flame retardant in a weight ratio of about 1:1 to about 1:10.

16. The flame retardant polyolefin formulation of any one of the preceding claims, wherein the inorganic flame retardant together with the polymer is present in the flame retardant polyolefin formulation in about 18 wt% to about 21 wt%, based on the total weight of the flame retardant polyolefin formulation.

17. A process for producing the flame retardant polyolefin formulation of any one of the preceding claims, the process comprising:

bonding 9,10-dihydro-9-oxa-10-phosphaphenanthrene 10-oxide to a monomeric unit to obtain a polymerisation precursor;

polymerizing the polymerisation precursor with at least one heterocyclic unit, wherein the backbone of the polymer is formed by the reaction product of the monomeric unit and the at least one heterocyclic unit;

obtaining the polymer of any one of the preceding claims by precipitation;

mixing the polymer with a polyolefin matrix and an inorganic flame retardant.

18. The process of claim 17, wherein bonding 9,10-dihydro-9-oxa-10-phosphaphenanthrene 10-oxide to the monomeric unit comprises heating a mixture of two

molecules of 9,10-dihydro-9-oxa-10-phosphaphenanthrene 10-oxide with a monomeric unit at a temperature of 160 °C to 190 °C.

19. The process of claim 17 or claim 18, wherein the polymerisation precursor is obtained by precipitation.

20. A moulded article comprising the flame retardant polyolefin formulation of any one of claims 1 to 16.