C L A I M S

1. Polymer, obtainable by polycondensation of

a) at least one phosphorous-containing monomer selected from adducts of
a1) 9,10-dihydro-9-oxa-10-phosphaphenanthrene- 10-oxide (DOPO)

and/or nuclear substituted DOPO derivatives, with

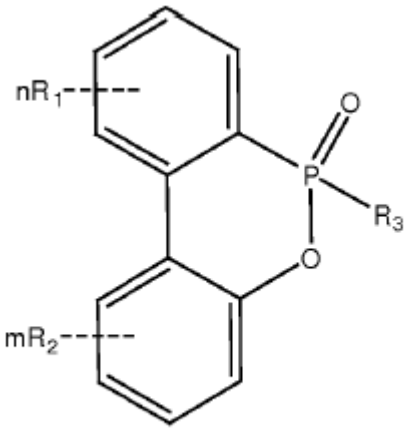
a2) at least one unsaturated di- or multivalent carboxylic acid or ester or anhydride thereof;

b) at least one secondary diamine; and

c) optionally other monomers.

2. Polymer according to claim 1 having a phosphorous content of at least 4 % by weight, preferably of at least 5 % by weight, more preferably of at least 7 % by weight, such as about 4 % to about 15 % by weight, preferably of about 5 % to about 9 % by weight, each of the total weight of the polymer.

3. Polymer according to claim 1 or 2, wherein the phosphorous-containing monomer a) is selected from a compound represented by the following general formula (I)



(I)

wherein n and m are integers from 0 to 4;

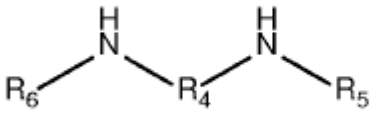
R_1 and R_2 are independently selected from alkyl, alkoxy, aryl, aryloxy and aralkyl, wherein, if more than one of R_1 and/or R_2 are present, each of these substituents can be identical or different to each other; and

R_3 denotes a residue derived from the unsaturated di- or multivalent carboxylic acid or ester or anhydride thereof;

preferably, wherein R 1 and R 2 are independently selected from C_{1-8} alkyl and C_{1-8} alkoxy; and n and m are independently 0 or 1.

4. Polymer according to any of the preceding claims, wherein the unsaturated di- or multivalent carboxylic acid or ester or anhydride thereof is a divalent carboxylic acid or ester or anhydride thereof which preferable is selected from the group consisting of itaconic acid, maleic acid, fumaric acid, endomethylene tetrahydrophthalic acid, citraconic acid, mesaconic acid, and tetrahydrophthalic acid and esters and anhydrides thereof;
preferably, wherein the unsaturated divalent carboxylic acid is selected from itaconic acid, maleic acid and anhydrides thereof.

5. Polymer according to any of the preceding claims, wherein the secondary diamine b) is a compound represented by the following general formula (II):



(II)

wherein R_4 , R_s and R_6 independently represent hydrocarbon residues which may contain one or more heteroatoms and which may form one or more rings with themselves or any of each other of R_4 , R_s and/or R_6 .

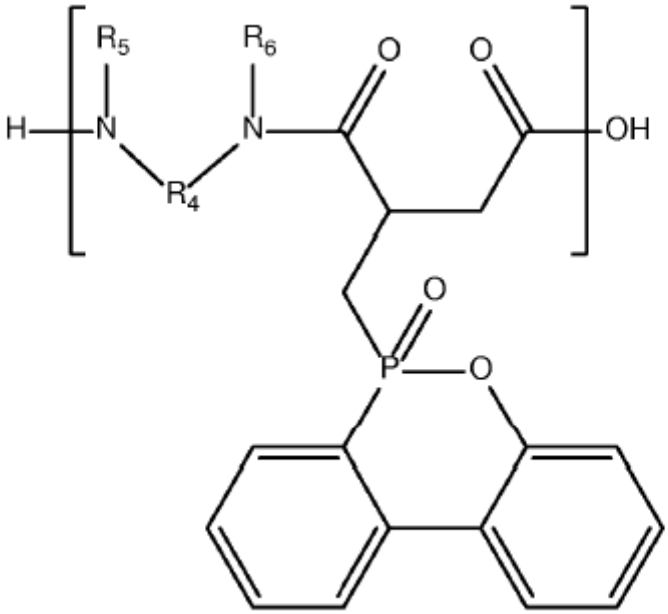
6. Polymer according to claim 5, wherein R_4 , R_s and R_6 independently represent aryl, heteroaryl or linear, branched and/or cyclic C_{1-30} alkyl residues, or any combination thereof, wherein the C_{1-30} alkyl residues may be substituted or interrupted by one or more heteroatoms and/or one or more aryl groups.

7. Polymer according to claim 5 or 6, wherein R_4 is arylene or linear, branched and/or cyclic C_{1-20} alkylene, or any combination thereof, wherein the C_{1-20} alkylene may be interrupted by one or more heteroatoms, preferably selected from N and O, wherein, if the heteroatom is N, it preferably forms a tertiary amine, more preferably -N(C_{1-6} alkyl)-.

8. Polymer according to any of claims 5 to 7, wherein Rs and R 6 independently represent aryl, C 1_3 alkylaryl, or linear, branched and/or cyclic C_{1_6} alkyl, or wherein R_s and R_6 together have 1 to 3 carbon atoms and form a ring together with -NH-R_4 -NH-, or wherein R_4 and/or R_s represent a C_{1-3} alkylene residue forming a ring together with R_4.

9. Polymer according to any of the preceding claims, wherein the secondary diamine b) is selected from the group consisting of 4,4'-bipiperidine, piperazine, 4,4'-ethylenedipiperidine, N,N'-dimethyl-1,6-hexanediamine, N,N'-dimethyl-1,8-octanediamine, N,N'-diethyl-1,3-propanediamine, N,N'-dimethyl-1,3-propanediamine, N,N'-diisopropyl-1,3-propanediamine, N,N'-diethylethylenediamine, N,N'-dimethylethylenediamine, N,N'-diisopropylethylenediamine, N,N'-diphenylethylenediamine, N,N'-dibenzylethylenediamine, trans-N,N'-dimethylcyclohexane-1,2-diamine, N,N-bis[3-(methylamino)propyl]methylamine, and 4,4'-trimethylenedipiperidine, or salt thereof or mixture thereof.

10. Polymer according to any of the preceding claims comprising repeating units represented by the following general formula (III):



(III)

wherein R_4 , R_5 and R_6 are defined as in claims 5 to 8.

11. Method of preparing a polymer according to any of claims 1-10, wherein the method comprises the steps of

a) reacting 9, 10-dihydro-9-oxa- 10-phosphaphenanthrene- 10-oxide (DOPO) and/or nuclear substituted derivatives thereof with at least one unsaturated di- or multivalent carboxylic acid or ester or anhydride thereof to obtain a first phosphorous-containing monomer;

b) reacting the first phosphorous-containing monomer obtained in step a) with at least one secondary diamine, and optionally other monomers; and

c) optionally carrying out the reaction step b) in the presence of at least one monovalent carboxylic acid and/or monovalent secondary amine and/or reacting the polymer obtained in step b) with at least one monovalent carboxylic acid and/or monovalent secondary amine to obtain an end-capped polymer.

12. Thermoplastic polymer composition comprising a thermoplastic polymer and a polymer according to any of claims 1-10, wherein the thermoplastic polymer is preferably selected from the group consisting of polyamides, polyphthalamides, polyesters including unsaturated polyester resins, polysulfones, polyimides, polyolefins, polyacrylates, polyether etherketones, acrylnitril butadiene styrenes (ABS), polyurethanes, polystyrenes,polycarbonates, polyphenylene oxides, phenolic resins and mixtures thereof.

13. Thermoplastic polymer composition according to claim 12, wherein the thermoplastic polymer is at least one polyamide, preferably at least one polyamide selected from the group consisting of PA6.6, PA6, PA6.10, PA6.12, PA MXD.6, PA11, PA12, PA6.6/6, P6.6/6.T, and mixtures thereof.

14. Thermoplastic polymer composition according to claim 12 or 13, which comprises at least 0.1 % by weight, preferably from about 0.1 % by weight to about 30 % by weight, more preferably from about 2 % by weight to about 25 % by weight, and even more preferably from about 6 % by weight to about 20 % by weight of the polymer according to any of claims 1 to 10, each based on the total weight of the thermoplastic polymer composition.

15. Use of the polymer according to any of claims 1-10 as flame-retardant polymer.