CLAIMS:

1. A polyamide comprising at least one repeating unit of formula 1:

$$-[OC\text{-}Ar\text{-}O\text{-}P(=O)(\text{-}Ar)\text{-}O\text{-}Ar\text{-}CO\text{-}NH\text{-}R\text{-}NH]- \qquad (I)$$

wherein

Ar is independently selected from the group consisting of aryl, arylene, heteroaryl and carbocyclic group;

R represents a covalent bond or a divalent hydrocarbon-based group selected from the group consisting of saturated or unsaturated aliphatics, saturated or unsaturated cycloaliphatics, aromatics, arylaliphatics, and alkylaromatics.

2. The polyamide according to claim 1, wherein R is selected from the group consisting of hydrogenated aliphatics, cycloaliphatics, aromatics, and alicyclics.

3. The polyamide according to claim 1, wherein R is selected from the group consisting of meta-xylelenyl moiety, and para-xylelenyl moiety.

4. The polyamide according to claim 1, wherein Ar is selected from aryl, arylene, heteroaryl and carbocyclic group having from C_1 to C_{18} carbon atoms.

5. The polyamide according to claim 1, wherein Ar is a phenyl group or a phenylene group.

6. The polyamide according to claim 1, wherein the polyamide comprises at least one repeating unit of formula I:

$$-[OC\text{-}phenylene\text{-}O\text{-}P(=O)(\text{-}phenyl)\text{-}O\text{-}phenylene\text{-}CO\text{-}NH\text{-}R\text{-}NH]- \qquad (I)$$

wherein

R represents a covalent bond or a divalent hydrocarbon-based group selected from the group consisting of saturated or unsaturated aliphatics, saturated or unsaturated cycloaliphatics, aromatics, arylaliphatics, and alkylaromatics.

7. The polyamide according to claim 1, wherein said polyamide is a homopolyamide only made of

repeating units of formula I.

8. The polyamide according to claim 1, wherein the polyamide is a copolyamide further comprising other repeating units different from the unit of formula (I), said repeating units originating from co-monomers such as dicarboxylic acids, diamines, amino acids and/ or lactams.

9. The polyamide according to claim 1, wherein said polyamide comprises from 0.1 to 100 mole% of repeating unit of Formula I, based on the total amount of residues of monomer units.

10. A process for preparing the polyamide according to claim 1, wherein the process comprises a polycondensation reaction between:

- at least one dicarboxylic acid of formula (II) below:

$$X_1OOC\text{-}Ar\text{-}O\text{-}P(=O)(\text{-}Ar)\text{-}O\text{-}Ar\text{-}COOX_2 \qquad (II)$$

wherein Xi and X_2 are independently selected from hydrogen, alkyl group or halogen group; Ar as defined in claim 1;

and

- at least one diamine of formula (III) below:

$$H_2N\text{-}R\text{-}NH_2 \qquad (III)$$

with R as defined in claim 1, to obtain the polyamide.

11. The process according to claim 10 wherein said process also comprises the addition of other monomers in the polycondensation reaction medium.

12. The process according to claim 11 wherein said monomers are chosen from the group consisting of: dicarboxylic acids, diamines, amino acids and/or lactams.

13. The process according to claim 10, wherein the process comprises the addition of 0.1 to 60

mole% of the dicarboxylic acid of Formula (II), based on the total amount of residues of monomer units.

14. The process according to of claim 10, wherein the polyamide is synthesized by a polycondensation reaction between a dicarboxylic acid of Formula (II) in which Ar is phenyl or phenylene and a diamine of Formula (III) in which R is a xylene.

15. The process according to claim 10, wherein the polyamide is synthesized by a polycondensation reaction between a dicarboxylic acid of Formula (II) in which Ar is phenyl or phenylene and a diamine of Formula (III) in which R is a xylene, and adipic acid.