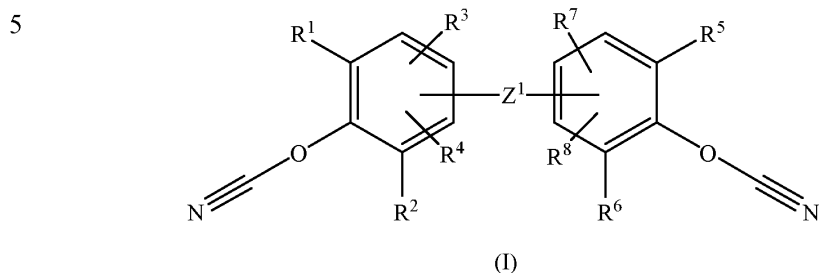


**Claims**

1. A composition comprising components (a) and (b) wherein component (a) is one or more cyanate esters independently selected from

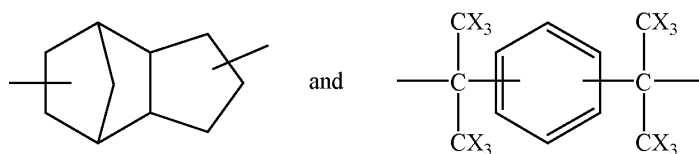
(i) a difunctional cyanate ester compound of formula (I)



wherein

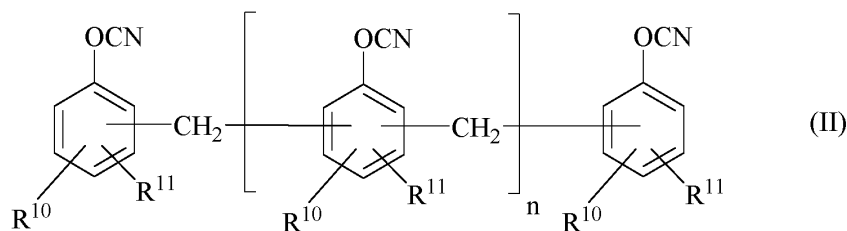
- 10  $R^1$  through  $R^8$  are independently selected from the group consisting of hydrogen, linear  $C_{1-10}$  alkyl, halogenated linear  $C_{1-10}$  alkyl, branched  $C_{4-10}$  alkyl, halogenated branched  $C_{4-10}$  alkyl,  $C_{3-8}$  cycloalkyl, halogenated  $C_{3-8}$  cycloalkyl,  $C_{1-10}$  alkoxy, halogen, phenyl and phenoxy;

- 15  $Z^1$  indicates a direct bond or a divalent moiety selected from the group consisting of  $-O-$ ,  $-S-$ ,  $-S(=O)-$ ,  $-S(=O)_2-$ ,  $-CH_2-$ ,  $-CH(CH_3)-$ ,  $-C(CH_3)_2-$ ,  $-CH(CF_3)-$ ,  $-C(CF_3)_2-$ ,  $-C(=O)-$ ,  $-C(=CH_2)-$ ,  $-C(=CCl_2)-$ ,  $-Si(CH_3)_2-$ , linear  $C_{1-10}$  alkanediyl, branched  $C_{4-10}$  alkanediyl,  $C_{3-8}$  cycloalkanediyl, 1,2-phenylene, 1,3-phenylene, 1,4-phenylene,  $-N(R^{13})-$  wherein  $R^{13}$  is selected from the group consisting of hydrogen, linear  $C_{1-10}$  alkyl, halogenated linear  $C_{1-10}$  alkyl, branched  $C_{4-10}$  alkyl, halogenated branched  $C_{4-10}$  alkyl,  $C_{3-8}$  cycloalkyl, phenyl and phenoxy, and moieties of formulas
- 20



- 25 wherein X is independently selected from hydrogen and halogen; and oligomers, prepolymers, polymers or mixtures thereof;
- and/or

(ii) a polyfunctional cyanate ester of formula (II)



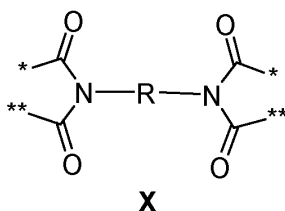
wherein

n is an integer from 1 to 20; and  $R^{10}$  and  $R^{11}$  are identical or different and independently from each other selected from the group consisting of hydrogen, linear  $C_{1-10}$  alkyl and branched  $C_{4-10}$  alkyl; and oligomers, prepolymers, polymers or mixtures thereof;

and mixtures of cyanate esters of formula (I) and (II);

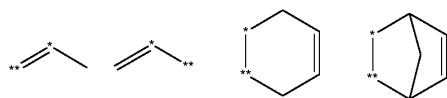
and wherein

component (b) is one or more substituted bisimide compound independently selected from a compound of formula (X)



wherein \* and \*\* each denotes a covalent bond to the respective C atom denoted with \* and \*\* of a residue,

wherein the residues are identical or different and independently selected from

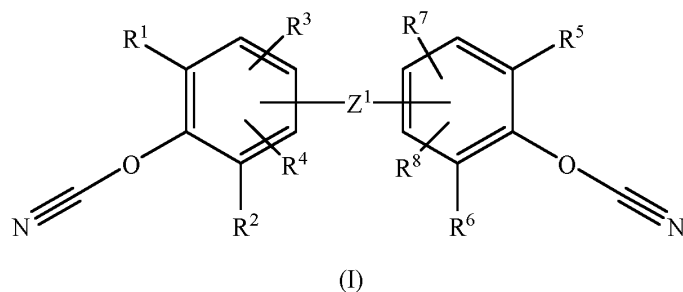


and wherein R is independently selected from alkyl, cycloalkyl, alkyne, aryl, aralkyl and alkaryl;

and, oligomers, prepolymers, polymers or mixtures of these compounds.

2. A composition according to claim 1 wherein component (a) is one or more cyanate esters independently selected from

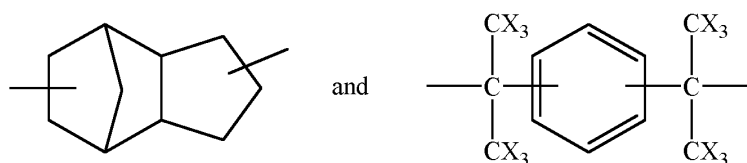
(i) a difunctional cyanate ester compound of formula (I)



5 wherein

$R^1$  through  $R^8$  are independently selected from the group consisting of hydrogen, linear  $C_{1-10}$  alkyl,  $C_{3-8}$  cycloalkyl;

$Z^1$  indicates a direct bond or a divalent moiety selected from the group consisting of  
 10  $-O-$ ,  $-S-$ ,  $-S(=O)-$ ,  $-S(=O)_2-$ ,  $-CH_2-$ ,  $-CH(CH_3)-$ ,  $-C(CH_3)_2-$ ,  $-CH(CF_3)-$ ,  
 $-C(CF_3)_2-$ ,  $-C(=O)-$ ,  $-C(=CH_2)-$ ,  $-C(=CCl_2)-$ ,  $-Si(CH_3)_2-$ , linear  $C_{1-10}$  alkanediyl,  
 branched  $C_{4-10}$  alkanediyl,  $C_{3-8}$  cycloalkanediyl, 1,2-phenylene, 1,3-phenylene,  
 1,4-phenylene,  $-N(R^{13})-$  wherein  $R^{13}$  is selected from the group consisting of hydrogen,  
 linear  $C_{1-10}$  alkyl,  $C_{3-8}$  cycloalkyl, phenyl and phenoxy, and moieties of formulas



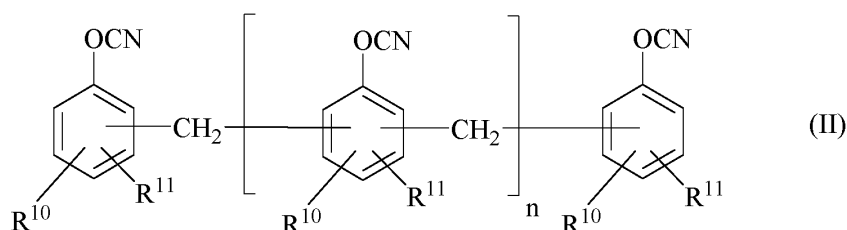
15

wherein X is independently selected from hydrogen and halogen; and oligomers, prepolymers, polymers or mixtures thereof;

and/or

20

(ii) a polyfunctional cyanate ester of formula (II)



wherein

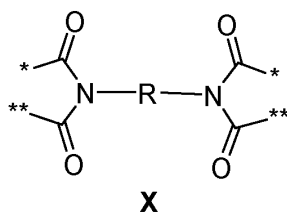
n is an integer from 1 to 20; and  $R^{10}$  and  $R^{11}$  are identical or different and independently from each other selected from the group consisting of hydrogen, linear  $C_{1-10}$  alkyl and

5

branched  $C_{4-10}$  alkyl; and oligomers, prepolymers, polymers or mixtures thereof;

and mixtures of cyanate esters of formula (I) and (II).

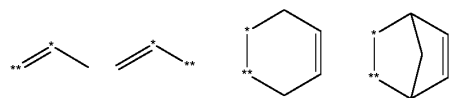
3. A composition according to claim 1 or 2 wherein component (b) is one or more substituted bisimide compound independently selected from a compound of formula (X)



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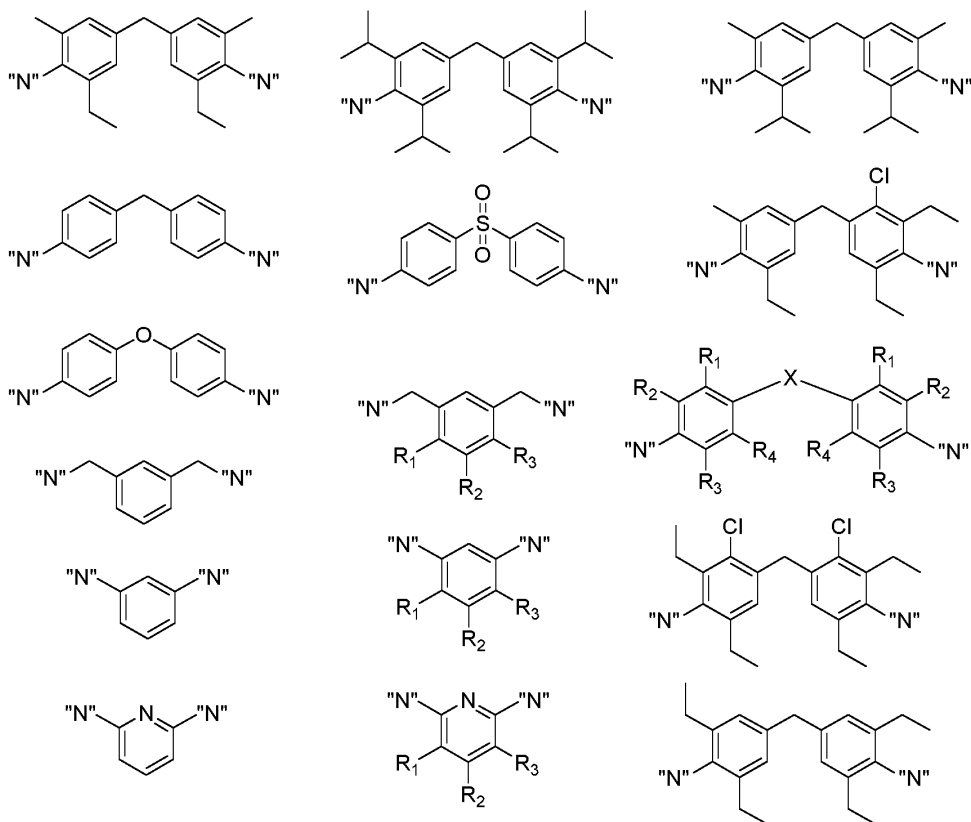
wherein \* and \*\* each denotes a covalent bond to the respective C atom denoted with \* and \*\* of a residue,

wherein the residues are identical or different and independently selected from



15

and wherein R is independently selected from aryl, linear or branched  $C_{1-10}$  alkyl,  $C_3$ - $C_8$  cycloalkyl,  $C_{2-10}$  alkyne or the moiety  $\langle\langle "N"-R-"N">>$ , wherein  $\langle\langle "N"-R-"N">>$  is an aromatic amine moiety independently selected from ("N" denotes the point of connectivity)

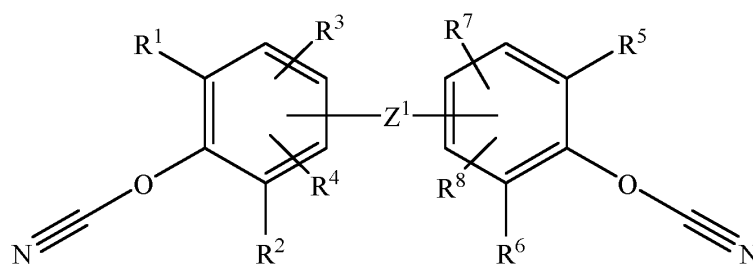


wherein

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each independently selected from hydrogen, C<sub>2</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkene, C<sub>2</sub>-C<sub>20</sub> alkyne, halogen (preferably Cl, Br, F, or I), NO<sub>2</sub>, and sulfone;

- 5 X is independently selected from C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkene, C<sub>2</sub>-C<sub>20</sub> alkyne and sulfone;  
and oligomers, prepolymers, polymers or mixtures thereof.

4. A composition according to any one of claims 1, 2 or 3 wherein component (a) is one  
10 or more cyanate esters independently selected from  
(i) a difunctional cyanate ester compound of formula (I)



(I)

wherein

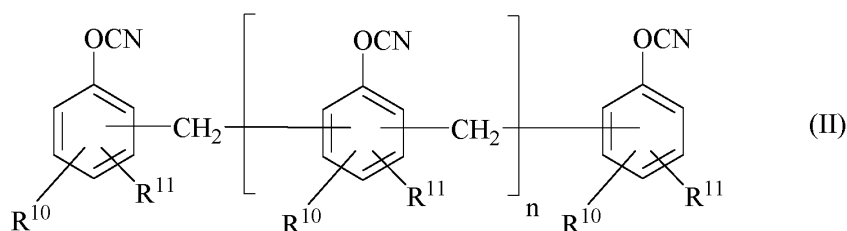
$R^1$  through  $R^8$  are independently selected from the group consisting of hydrogen, linear  $C_{1-3}$  alkyl;

5  $Z^1$  indicates a direct bond or a divalent moiety selected from the group consisting of  $-O-$ ,  $-S-$ ,  $-S(=O)_2-$ ,  $-CH_2-$ ,  $-CH(CH_3)-$ ,  $-C(CH_3)_2-$ ,  $-C(CF_3)_2-$ ,  $-C(=CCl_2)-$ , branched  $C_{4-6}$  alkanediyl,  $C_{3-8}$  cycloalkanediyl, 1,2-phenylene, 1,3-phenylene, 1,4-phenylene; and oligomers, prepolymers, polymers or mixtures thereof;

and/or

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(ii) a polyfunctional cyanate ester of formula (II)

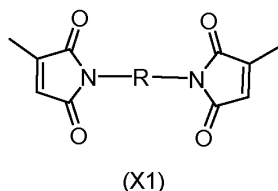


wherein

$n$  is an integer from 1 to 10; and  $R^{10}$  and  $R^{11}$  are identical or different and independently  
 15 from each other selected from the group consisting of hydrogen, linear  $C_{1-5}$  alkyl and branched  $C_{4-6}$  alkyl; and oligomers, prepolymers, polymers or mixtures thereof;

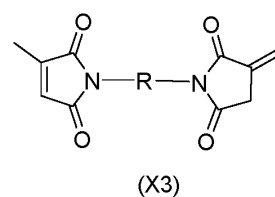
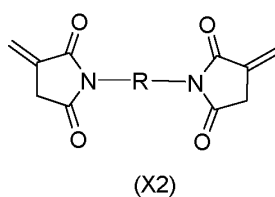
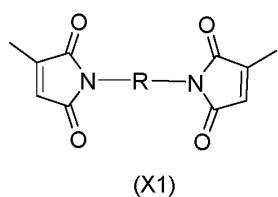
and mixtures of cyanate esters of formula (I) and (II).

5. A composition according to any one of claims 1, 2, 3 or 4 wherein component (b) is one or more substituted bisimide independently selected from a biscitraconimide compound of formula (X1),



- 5 wherein R is selected from o-xylylene, and oligomers, prepolymers, polymers or mixtures thereof, or

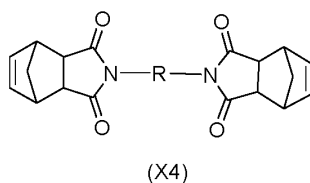
b1) at least one selected from the group of biscitraconimide compound of formula (X1), bisitaconimide compound of formula (X2) and citraconimido-itaconimide compound of formula (X3),



10

or

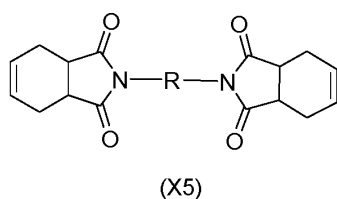
b2) a bisnadimide compound of formula (X4) and oligomers, prepolymers, polymers or mixtures thereof,



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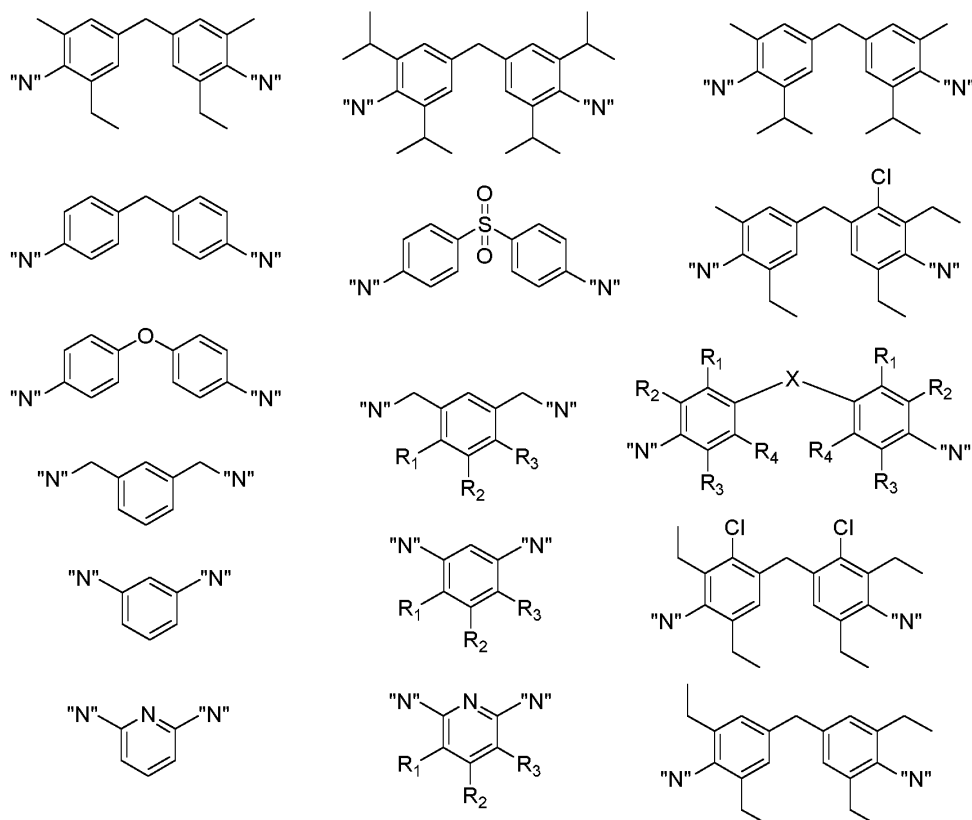
or

b3) a bistetrahydroimide compound of formula (X5) and oligomers, prepolymers, polymers or mixtures thereof



wherein R is independently selected from aryl, linear or branched C<sub>1</sub>-C<sub>10</sub> alkyl, C<sub>3</sub>-C<sub>8</sub> cycloalkyl, C<sub>2</sub>-C<sub>10</sub> alkyne or the moiety <<"N"-R-"N">>, wherein <<"N"-R-"N">> is an aromatic amine moiety independently selected from ("N" denotes the point of connectivity)

5



wherein

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each independently selected from hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkene, C<sub>2</sub>-C<sub>20</sub> alkyne, halogen (preferably Cl, Br, F, or I), NO<sub>2</sub>, and sulfone;

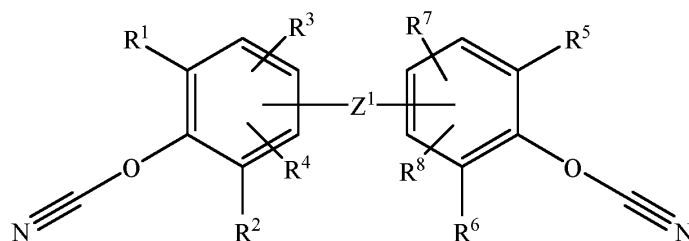
X is independently selected from C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkene, C<sub>2</sub>-C<sub>20</sub> alkyne and sulfone;

10

and oligomers, prepolymers, polymers or mixtures thereof.

6. A composition according to any one of claims 1, 2, 3, 4 or 5 wherein component (a) is one or more cyanate esters independently selected from

(i) a difunctional cyanate ester compound of formula (I)

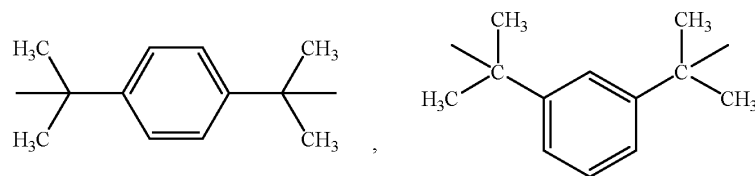


(I)

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wherein the difunctional cyanate ester of formula I is independently selected from the group consisting of

- i)  $R^1, R^2, R^5$  and  $R^6$  are methyl,  $R^3, R^4, R^7$  and  $R^8$  are hydrogen and wherein  $Z^1$  is  $-\text{CH}_2-$  (methylene) and oligomers, prepolymers, polymers or mixtures thereof, or
- 10 ii)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is  $-\text{C}(\text{CH}_3)_2-$  and oligomers, prepolymers, polymers or mixtures thereof, or
- iii)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is  $-\text{S}-$  and oligomers, prepolymers, polymers or mixtures thereof, or
- 15 iv)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is  $-\text{C}(\text{CF}_3)_2-$  and oligomers, prepolymers, polymers or mixtures thereof, or
- v)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is  $-\text{C}(\text{=CCl}_2)-$  and oligomers, prepolymers, polymers or mixtures thereof, or
- vi)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is independently selected from the group consisting of

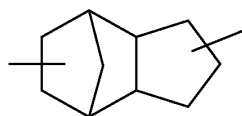


20

(Primaset® LM-

500) and oligomers, prepolymers, polymers or mixtures thereof, or

- vii)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is

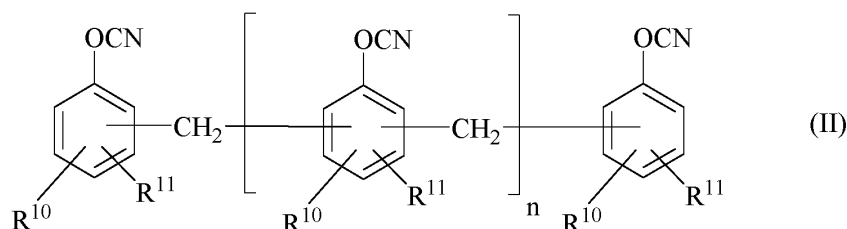


(Primaset® DT-4000) and oligomers, prepolymers, polymers or mixtures thereof, or

viii)  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is  $-\text{CH}(\text{CH}_3)-$  and oligomers, prepolymers, polymers or mixtures thereof,

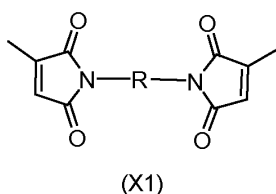
5 and oligomers, prepolymers, polymers or mixtures thereof;  
and/or

(ii) a polyfunctional cyanate ester of formula (II)



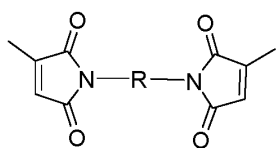
10 wherein the polyfunctional cyanate ester is independently selected from the group consisting of compound III, compound IV, compound V, compound VI, and oligomers, prepolymers, polymers or mixtures thereof.

7. A composition according to any one of claims 1, 2, 3, 4, 5 or 6 wherein component (b)  
15 is one or more substituted bisimide independently selected from a biscitraconimide compound of formula (X1),

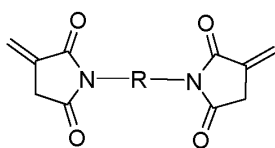


wherein R is selected from o-xylylene, and oligomers, prepolymers, polymers or mixtures thereof, or

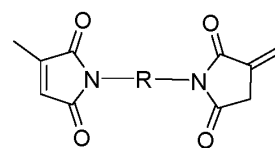
20 b1) at least one selected from the group of biscitraconimide compound of formula (X1), bisitaconimide compound of formula (X2) and citraconimido-itaconimide compound of formula (X3),



(X1)



(X2)

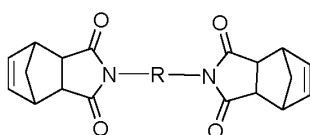


(X3)

or

b2) a bisnadimide compound of formula (X4) and oligomers, prepolymers, polymers

or mixtures thereof,

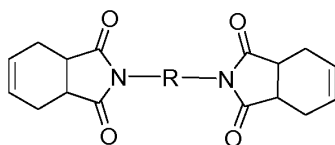


(X4)

5

or

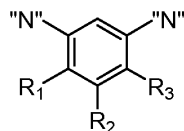
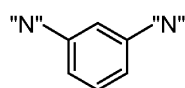
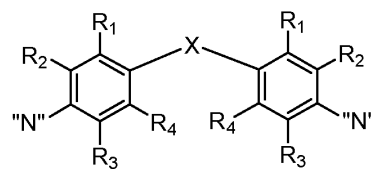
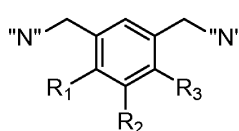
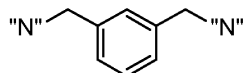
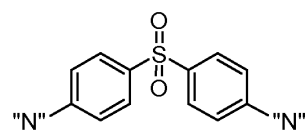
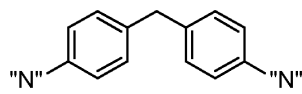
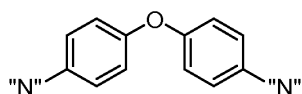
b3) a bistetrahydroimide compound of formula (X5) and oligomers, prepolymers, polymers or mixtures thereof



(X5)

10

wherein R is the moiety <<"N"-R-"N">> which is an aromatic amine moiety independently selected from ("N" denotes the point of connectivity)



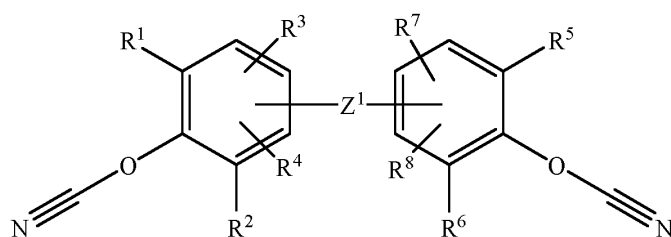
wherein

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each independently selected from hydrogen, C<sub>1</sub>-C<sub>5</sub> alkyl, halogen (preferably Cl, Br, or F), NO<sub>2</sub>, and sulfone; and oligomers, prepolymers, polymers or mixtures thereof.

- 5     8.     A composition according to any one of claims 1, 2, 3, 4, 5, 6 or 7 wherein the ratio of component (a) to (b) is 80 wt% component (a) to 20 wt% component (b) based on total amount of the resin composition.
- 10     9.     A composition according to any one of claims 1, 2, 3, 4, 5, 6, 7 or 8 wherein the composition further comprises a catalyst selected from the group consisting of aliphatic mono-, di- and polyamines, aromatic mono-, di- and polyamines, carbocyclic mono-, di- and polyamines, heterocyclic mono-, di- and polyamines, compounds containing a five- or six-membered nitrogen-containing heterocyclic ring, hydroxyamines, phosphines, phenols, and mixtures thereof.
- 15
10.     A composition according to any one of claims 1, 2, 3, 4, 5, 6, 7, 8 or 9 wherein the composition further comprises reinforcement fibres selected from the group consisting of carbon fibres, glass fibres (such as E glass fibres, S glass fibres), aramid fibres (including KEVLAR®), basalt fibres (geotextile fibers), natural fibres (such as flax, hemp, jute or sisal), fleeces and woven fabrics (multi-layered or single layered), and mixtures thereof.
- 20
11.     A composition according to any one of claims 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein the composition further comprise a filler selected from the group consisting of organic fillers, such as thermoplastics and elastomers, inorganic fillers, such as glass microspheres, graphite or silica, and mineral powder fillers, such as CaCO<sub>3</sub>, coated CaCO<sub>3</sub>, kaolin clay, SiO<sub>2</sub>, talc, graphite, corundum ( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>), wollastonite, SiC, glass microspheres, mica, calcium silicate (Ca<sub>2</sub>O<sub>4</sub>Si), MgO, anhydrous calcium sulfate (CaSO<sub>4</sub> or anhydrite), ceramic hollow microspheres, fused mullite (Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>), boron nitride (BN), vermiculite, or basalt, and mixtures thereof.
- 25
- 30

12. A composition according to any one of claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 wherein component (a) is one or more cyanate esters independently selected from

(i) a difunctional cyanate ester compound of formula (I)

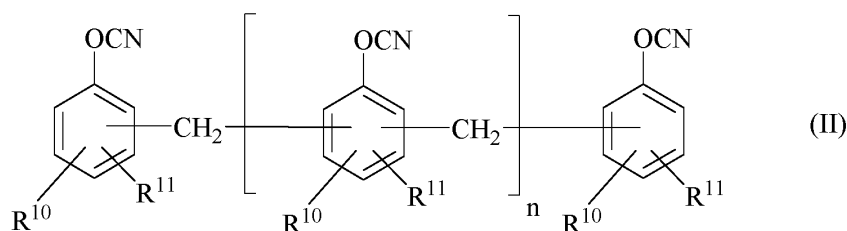


(I)

wherein  $R^1$  through  $R^8$  are hydrogen and  $Z^1$  is  $-\text{CH}(\text{CH}_3)-$  and oligomers, prepolymers, polymers or mixtures thereof;

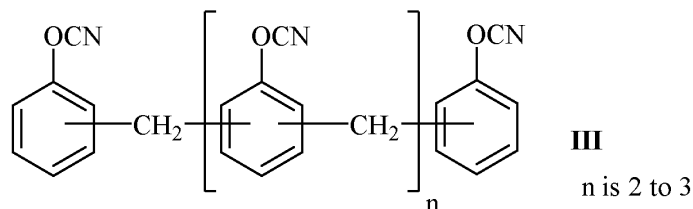
and/or

(ii) a polyfunctional cyanate ester of formula (II)



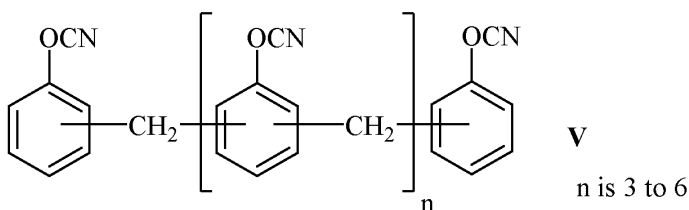
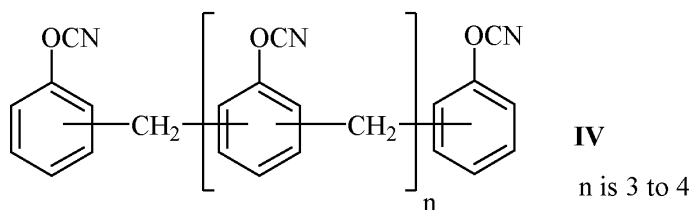
(II)

wherein the polyfunctional cyanate ester is independently selected from the group consisting of compound III, compound IV, compound V, and oligomers, prepolymers, polymers or mixtures thereof;



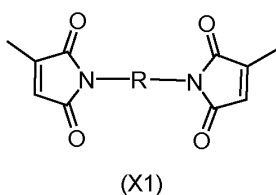
III

n is 2 to 3



and mixtures of cyanate esters of formula (I) and (II);

and wherein component (b) is a biscitraconimide compound of formula (X1),



5 wherein R is selected from o-xylylene, and oligomers, prepolymers, polymers or mixtures thereof.

13. A method for the preparation of a composition according to any one of claims 1-12 comprising the steps of:
- 10 i) providing a mixture components according to any one of claims 1-12; and  
ii) intimately mixing the components together.
14. A method for the preparation of a thermoset composite material comprising the steps of:
- 15 i) providing a mixture components according to any one of claims 1-12;  
ii) intimately mixing the components together;  
iii) casting the mixture into the desired form; and  
iv) initiating polymerization of the mixture.

15. Use of a composition as defined in any one of claims 1-12 for producing a thermoset composite material.