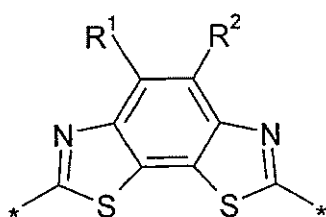


Patent Claims

1. Polymer comprising one or more identical or different repeating units containing a moiety of formula I



wherein an asterisk indicates a link to a neighbored group, and R^1 and R^2 are, each independently of one another, H, halogen, or an optionally substituted carbyl or hydrocarbyl group.

2. Polymer according to claim 1, wherein R^1 and R^2 in formula I are selected from H, straight-chain, branched or cyclic alkyl with 1 to 35 C atoms, in which one or more non-adjacent C atoms are optionally replaced by -O-, -S-, -C(O)-, -C(O)-O-, -O-C(O)-, -O-C(O)-O-, - $CR^0=CR^{00}$ - or - $C\equiv C$ - and in which one or more H atoms are optionally replaced by F, Cl, Br, I or CN, or denote aryl, heteroaryl, aryloxy, heteroaryloxy, arylcarbonyl, heteroarylcarbonyl, arylcarbonyloxy, heteroarylcarbonyloxy, aryloxycarbonyl or heteroaryloxycarbonyl having 4 to 30 ring atoms that is unsubstituted or substituted by one or more non-aromatic groups R^3 , wherein

R^3 is on each occurrence identically or differently F, Br, Cl, -CN, -NC, -NCO, -NCS, -OCN, -SCN, -C(O)NR⁰R⁰⁰, -C(O)X⁰, -C(O)R⁰, -NH₂, -NR⁰R⁰⁰, -SH, -SR⁰, -SO₃H, -SO₂R⁰, -OH, -NO₂, -CF₃, -SF₅, optionally substituted silyl, carbyl or hydrocarbyl with 1 to 40 C atoms that is optionally substituted and optionally comprises one or more hetero atoms, or P-Sp-,

R^0 and R^{00} are independently of each other H or optionally substituted C₁₋₄₀ carbyl or hydrocarbyl,

P is a polymerisable or crosslinkable group,

Sp is a spacer group or a single bond, and

5 X⁰ is halogen.

3. Polymer according to claim 1 or 2, which is selected of formula II



10

wherein

U is on each occurrence identically or differently a moiety of formula I as defined in claim 1,

15

Ar¹, Ar², Ar³ are, on each occurrence identically or differently, and independently of each other, aryl or heteroaryl that is optionally substituted, preferably by one or more groups R³ as defined in claim 2, and one or both of Ar¹ and Ar² may also denote a single bond,

20

Y¹ and Y² are independently of each other H, F, Cl or CN,

x is on each occurrence identically or differently 0, 1 or 2, wherein in at least one repeating unit, i.e. in at least one unit $-(Ar^1-U-Ar^2)_x-(Ar^3)_y-$, x is 1,

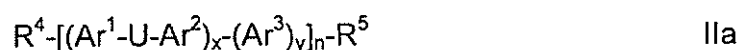
25

y is on each occurrence identically or differently 0, 1 or 2,

30

n is an integer > 1.

4. Polymer according to one or more of claims 1 to 3, which is selected of formula IIa



35

IIa

wherein U, Ar¹⁻³, n, x and y have the meanings of claim 3, and

R⁴ and R⁵ have independently of each other one of the meanings of R³ in claim 2, or denote -CH₂Cl, -CHO, -CH=CH₂, -SiR'R''R''', -SiX'X''R', -SiR'R''X', -SnR'R''R''', -BR'R'', -B(OR')(OR''), -B(OH)₂, O-SO₂-R', -ZnX', -C≡CH, -C≡C-SiR'R''R''' or P-Sp-, wherein P and Sp are as defined above, and R', R'' and R''' have independently of each other one of the meanings of R⁰ as defined in claim 2, and two of R', R'' and R''' may also form a ring together with the hetero atom to which they are attached, and X' and X'' are halogen atoms.

5. Polymer according to claim 3 or 4, wherein Ar¹ and Ar² are independently of each other selected from the group consisting of, thiophene-2,5-diyl, thiazole-2,5-diyl, selenophene-2,5-diyl, furan-2,5-diyl, thieno[3,2-b]thiophene-2,5-diyl, thieno[2,3-b]thiophene-2,5-diyl, selenopheno[3,2-b]selenophene-2,5-diyl, selenopheno[2,3-b]selenophene-2,5-diyl, selenopheno[3,2-b]thiophene-2,5-diyl, and selenopheno[2,3-b]thiophene-2,5-diyl, all of which are unsubstituted, or mono- or polysubstituted with R³ as defined in claim 2, and one of Ar¹ and Ar² may also denote a single bond.
6. Polymer according to one or more of claims 3 to 5, wherein Ar³ is, on each occurrence identically or differently, selected from the group consisting of 1,4-phenylene, thiophene-2,5-diyl, selenophene-2,5-diyl, thieno[3,2-b]thiophene-2,5-diyl, thieno[2,3-b]thiophene-2,5-diyl, selenopheno[3,2-b]selenophene-2,5-diyl, selenopheno[2,3-b]selenophene-2,5-diyl, selenopheno[3,2-b]thiophene-2,5-diyl, selenopheno[2,3-b]thiophene-2,5-diyl, benzo[1,2-b:4,5-b']di-thiophene-2,6-diyl, 2,2-dithiophene, 2,2-diselenophene, dithieno[3,2-b:2',3'-d]silole-5,5-diyl, 4*H*-cyclopenta[2,1-b:3,4-b']dithiophene-2,6-diyl, carbazole-2,7-diyl, fluorene-2,7-diyl, indaceno[1,2-b:5,6-b']di-thiophene-2,7-diyl, benzo[1'',2'':4,5;4'',5'':4',5'] bis(silolo[3,2-b:3',2'-b']thiophene)-2,7-diyl, phenanthro[1,10,9,8-c,d,e,f,g]carbazole-2,7-diyl, benzo[2,1,3]thiadiazole-4,7-diyl, benzo[2,1,3]selenadiazole-4,7-diyl, benzo[2,1,3]oxa-

diazole-4,7-diyl, 2H-benzotriazole-4,7-diyl, thieno[3,4-b]pyrazine-2,5-diyl, quinoxaline-5,8-diyl, thieno[3,4-b]thiophene-4,6-diyl, thieno[3,4-b]thiophene-6,4-diyl, 3,6-di-thien-2-yl-pyrrolo[3,4-c]pyrrole-1,4-dione, or [1,3]thiazolo[5,4-d][1,3]thiazole-2,5-diyl, thieno[2,1,3]thiadiazole-2,5-diyl, 2-thia-1,3,5,8-tetraaza-cyclopenta[b]naphthalene-4,9-diyl, thieno[3,4-c]pyrrole-4,6-dione-1,3-diyl, benzo[lmn][3,8]phenanthroline-1,3,6,8-tetraone-4,9-diyl, all of which are unsubstituted, or mono- or polysubstituted, preferably with R¹, R² or R³ as defined in claim 1 and 2.

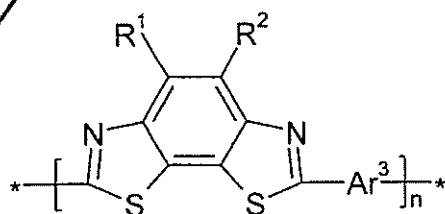
7. Polymer according to one or more of claims 1 to 6, wherein R¹ and/or R² are selected from the following groups:

a) the group consisting of primary alkyl or alkoxy with 1 to 30 C atoms, secondary alkyl or alkoxy with 3 to 30 C atoms, and tertiary alkyl or alkoxy with 4 to 30 C atoms, wherein in all these groups one or more H atoms are optionally replaced by F,

b) the group consisting of -C(O)-R⁶, -C(O)-O-R⁶, -O-C(O)-R⁶, wherein R⁶ is straight-chain, branched or cyclic alkyl with 1 to 30 C atoms, in which one or more non-adjacent C atoms are optionally replaced by -O-, -S-, -C(O)-, -C(O)-O-, -O-C(O)-, -O-C(O)-O-, -CR⁰=CR⁰⁰- or -C≡C- and in which one or more H atoms are optionally replaced by F, Cl, Br, I or CN,

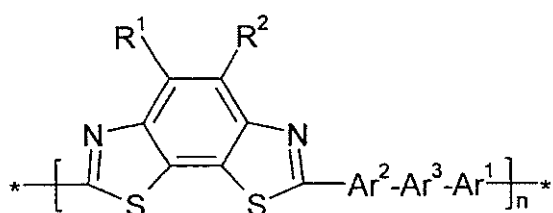
c) the group consisting of aryl, aryloxy, heteroaryl and heteroaryloxy that is optionally alkylated or alkoxyated and has 4 to 30 ring atoms.

8. Polymer according to one or more of claims 1 to 7, which is selected from the group consisting of the following subformulae:



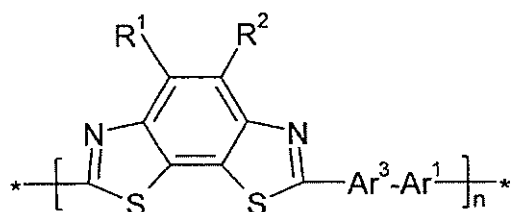
IIA

5



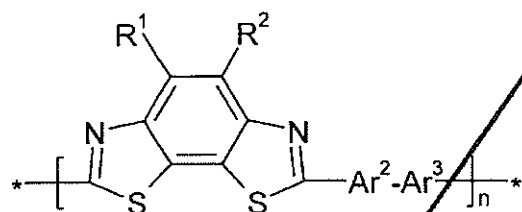
II B

10



II C

15



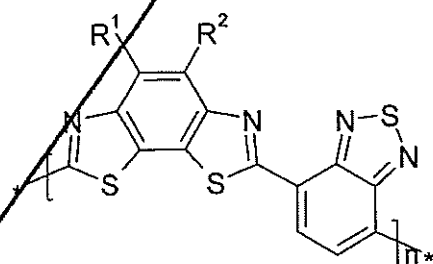
II D

20

wherein R^1 , R^2 , Ar^1 , Ar^2 , Ar^3 and n have the meanings given in one or more of claims 1 to 7, and wherein Ar^1 , Ar^2 and Ar^3 do not denote a single bond.

9. Polymer according to one or more of claims 1 to 8, which is selected from the group consisting of the following subformulae:

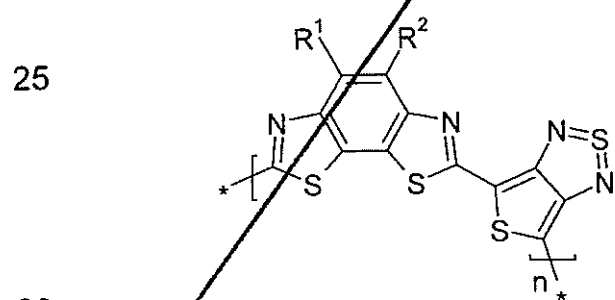
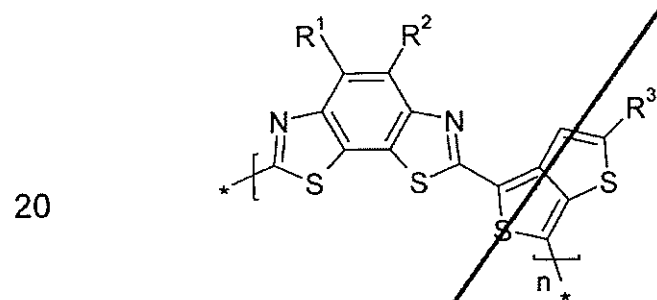
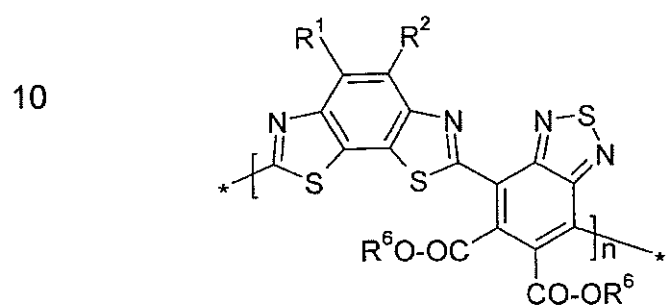
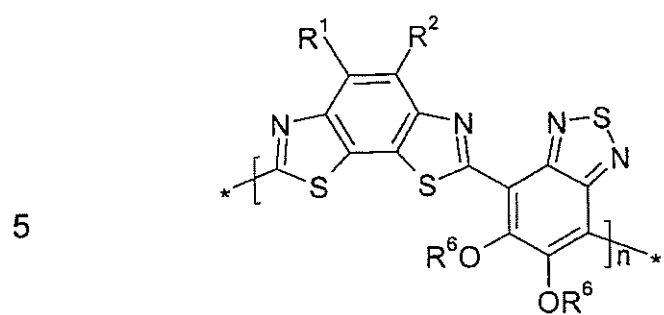
25



II 1

30

35



25

30

35

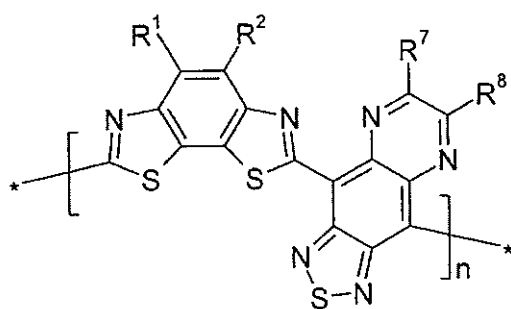
II2

II3

II4

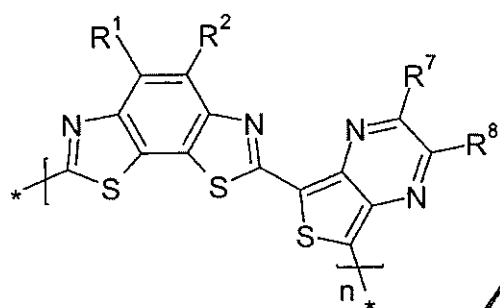
II5

5



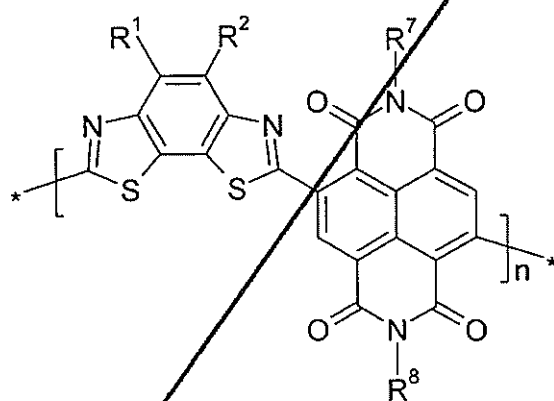
II6

10



II7

15

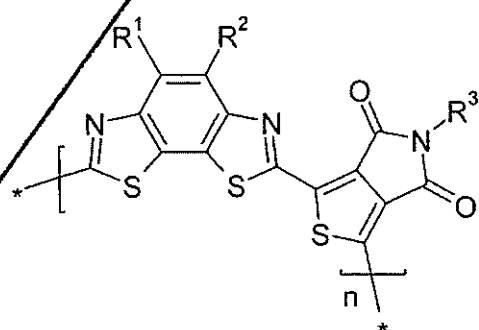


II8

20

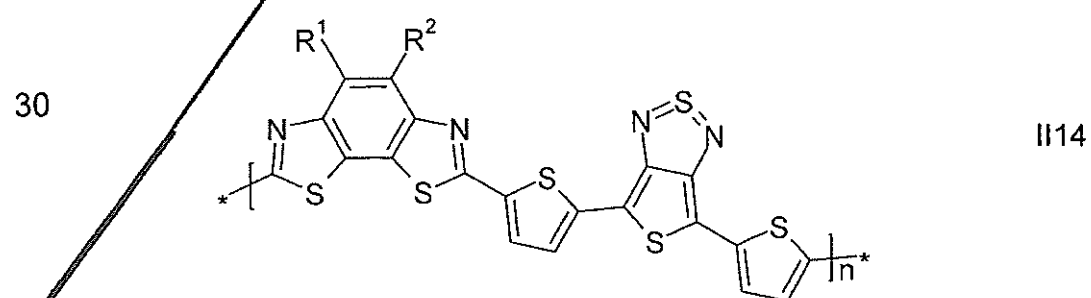
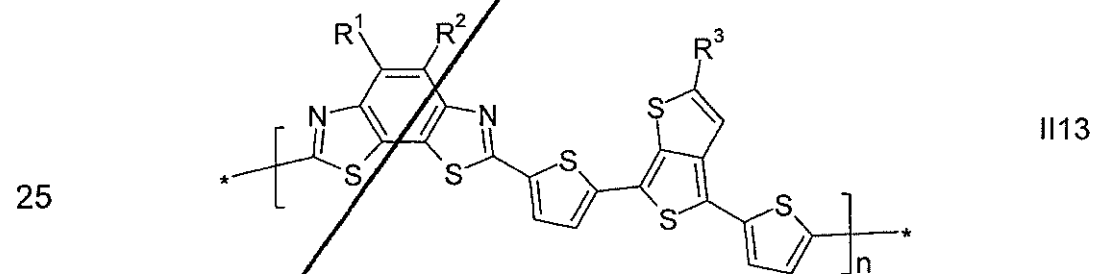
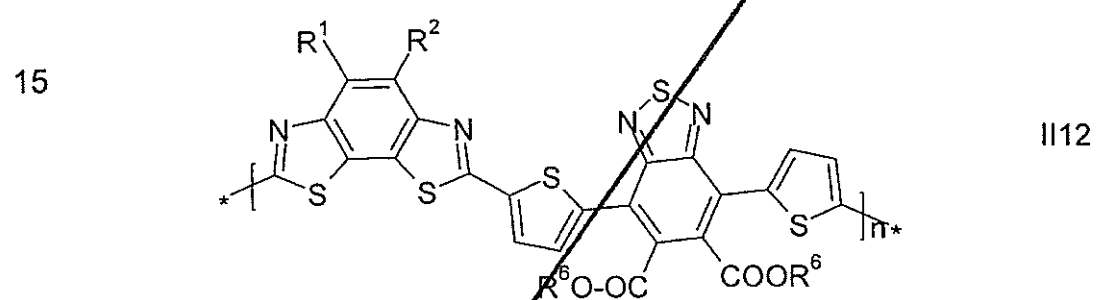
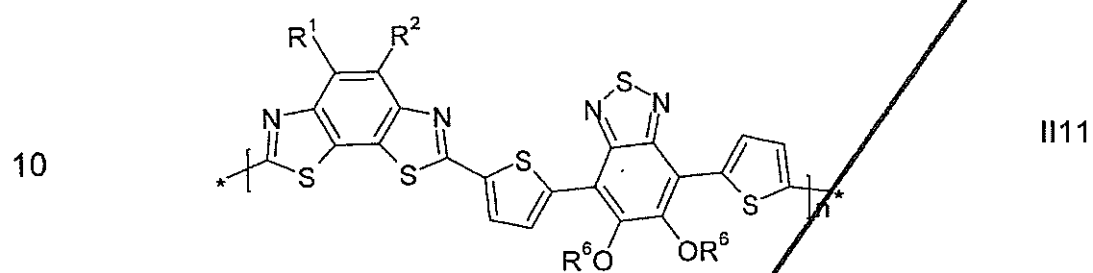
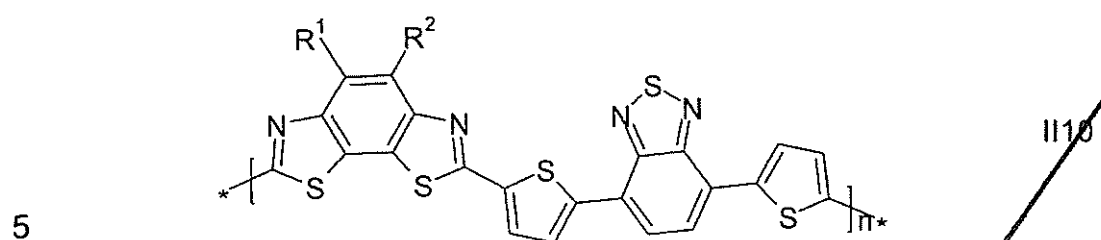
25

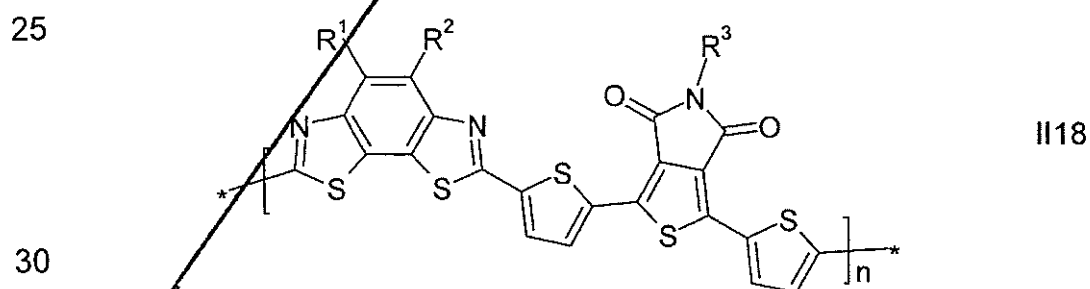
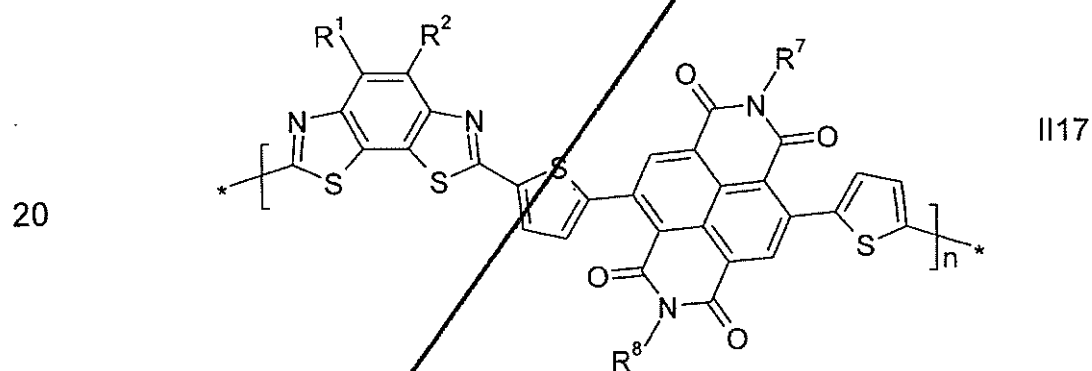
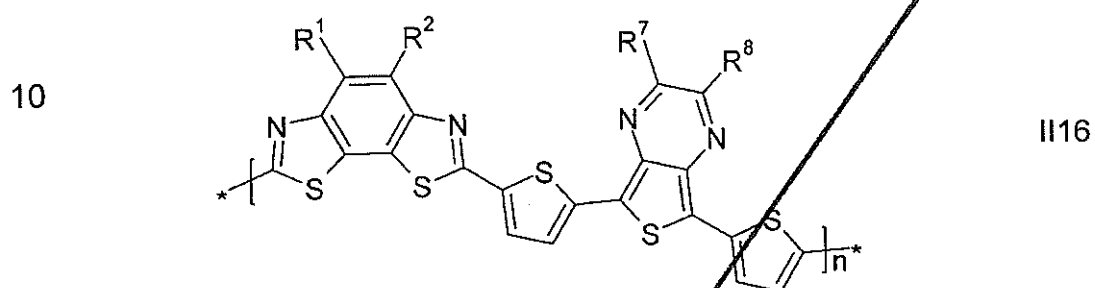
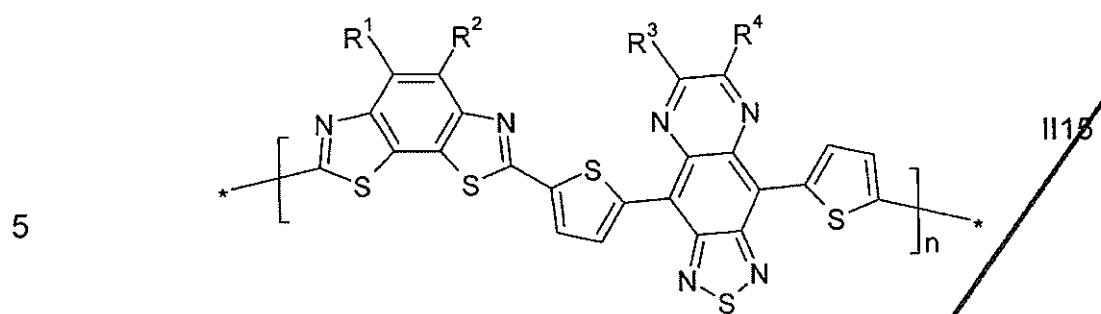
30

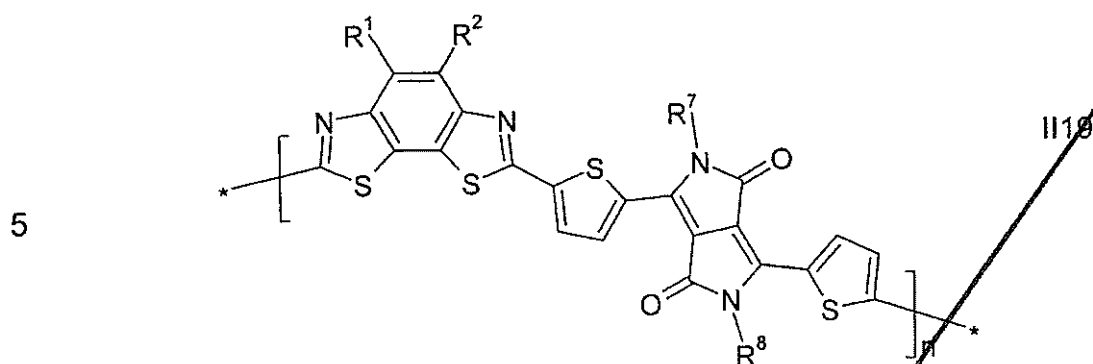


II9

35







10 wherein R^1 , R^2 , R^3 , R^6 and n have one of the meanings given in one or more of claims 1 to 8, and R^7 and R^8 have independently of each other one of the meanings of R^3 .

10. Polymer of the formula

15 R^4 -chain- R^5

wherein "chain" is a polymer chain selected from formulae IIA-IIID and II1-II19 as defined in claim 3 or 9, and R^4 and R^5 have one of the meanings given in claim 4.

20 11. Mixture or blend comprising one or more polymers according to one or more of claims 1 to 10 and one or more compounds or polymers having semiconducting, charge transport, hole/electron transport, hole/electron blocking, electrically conducting, photoconducting or light emitting properties.

25 12. Formulation comprising one or more polymers, mixtures or blends according to one or more of claims 1 to 11, and one or more solvents, preferably selected from organic solvents.

30 13. Use of a polymer, mixture, blend or formulation according to one or more of claims 1 to 12 as charge transport, semiconducting, electrically conducting, photoconducting or light emitting material in optical, electrooptical, electronic, electroluminescent or photoluminescent components or devices.

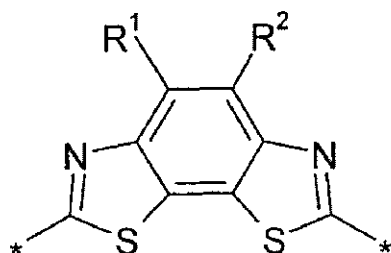
35 14. Optical, electrooptical or electronic component or device comprising

one or more polymers, mixtures, blends or formulations according to one or more of claims 1 to 12.

- 5 15. Component or device according to claim 14, which is selected from the group consisting of organic field effect transistors (OFET), thin film transistors (TFT), integrated circuits (IC), logic circuits, capacitors, radio frequency identification (RFID) tags, devices or components, organic light emitting diodes (OLED), organic light emitting transistors (OLET), flat panel displays, backlights of displays, organic
- 10 photovoltaic devices (OPV), solar cells, laser diodes, photoconductors, photodetectors, electrophotographic devices, electrophotographic recording devices, organic memory devices, sensor devices, charge injection layers, charge transport layers or interlayers in polymer light emitting diodes (PLEDs), Schottky diodes,
- 15 planarising layers, antistatic films, polymer electrolyte membranes (PEM), conducting substrates, conducting patterns, electrode materials in batteries, alignment layers, biosensors, biochips, security markings, security devices, and components or devices for detecting and discriminating DNA sequences.
- 20 16. Component or device according to claim 14 or 15, which is an OFET or a bulk heterojunction OPV device.
- 25 17. Monomer of formula Ia
- $$R^4-Ar^1-U-Ar^2-R^5 \quad Ia$$
- wherein U, Ar¹, Ar², R⁴ and R⁵ are as defined in one or more of claims 3 to 6.
- 30 18. Process of preparing a polymer according to one or more of claims 1 to 10, by coupling one or more monomers according to claim 17 with each other, and/or with one or more monomers of the formula
- $$R^4-Ar^3-R^5$$
- 35 wherein R⁴, R⁵ and Ar³ are as defined in one or more of claims 3 to 6, in an aryl-aryl coupling reaction.

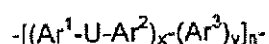
Patent Claims

1. Polymer comprising one or more identical or different repeating units containing a moiety of formula I



I

wherein an asterisk indicates a link to a neighbored group, and R¹ and R² are, each independently of one another, H, halogen, or an optionally substituted carbyl or hydrocarbyl group and wherein the polymer is selected of formula II



II

wherein

U is on each occurrence identically or differently a moiety of formula I as defined in claim 1,

Ar¹, Ar², Ar³ are, on each occurrence identically or differently, and independently of each other, aryl or heteroaryl that is optionally substituted, preferably by one or more groups R³ as defined in claim 2, and one or both of Ar¹ and Ar² may also denote a single bond,

Y¹ and Y² are independently of each other H, F, Cl or CN,

x is on each occurrence identically or differently 0, 1 or 2, wherein in at least one repeating unit, i.e. in at least one unit $-(Ar-U-Ar^2)_x-(Ar^3)_y-$, x is 1,

y is on each occurrence identically or differently 0, 1 or 2,

n is an integer > 1;

wherein Ar^3 is, on each occurrence identically or differently, selected from the group consisting of 1,4-phenylene, thiophene-2,5-diyl, selenophene-2,5-diyl, thieno[3,2-b]thiophene-2,5-diyl, thieno[2,3-b]thiophene-2,5-diyl, selenopheno[3,2-b]selenophene-2,5-diyl, selenopheno[2,3-b]selenophene-2,5-diyl, selenopheno[3,2-b]thiophene-2,5-diyl, selenopheno[2,3-b]thiophene-2,5-diyl, benzo[1,2-b:4,5-b']dithiophene-2,6-diyl, 2,2-dithiophene, 2,2-diselenophene, dithieno[3,2-b:2',3'-d]silole-5,5-diyl, 4H-cyclopenta[2,1-b:3,4-b']dithiophene-2,6-diyl, carbazole-2,7-diyl, fluorine-2,7-diyl, indaceno[1,2-b:5,6-b']dithiophene-2,7-diyl, benzo[1",2":4,5;4",5":4',5'] bis(silolo[3,2-b:3',2'-b']thiophene)-2,7-diyl, phenanthro[1,10,9,8-c,d,e,f,g]carbazole-2,7-diyl, benzo[2,1,3]thiadiazole-4,7-diyl, benzo[2,1,3]selenadiazole-4,7-diyl, benzo[2,1,3]oxadiazole-4,7-diyl, 2H-benzotriazole-4,7-diyl, thieno[3,4-b]pyrazine-2,5-diyl, quinoxaline-5,8-diyl, thieno[3,4-b]thiophene-4,6-diyl, thieno[3,4-b]thiophene-6,4-diyl, 3,6-di-thien-2-yl-pyrrolo[3,4-c]pyrrole-1,4-dione, or [1,3]thiazolo[5,4-d][1,3]thiazole-2,5-diyl, thieno[2,1,3]thiadiazole-2,5-diyl, 2-thia-1,3,5,8-tetraaza-cyclopenta[b]naphthalene-4,9-diyl, thieno[3,4-c]pyrrole-4,6-dione-1,3-diyl, benzo[lmn][3,8]phenanthroline-1,3,6,8-tetra- one-4,9-diyl, all of which are unsubstituted, or mono- or polysubstituted.

2. Polymer according to claim 1, wherein R^1 and R^2 in formula I are selected from H, straight-chain, branched or cyclic alkyl with 1 to 35 C atoms, in which one or more non-adjacent C atoms are optionally replaced by -O-, -S-, -C(O)-, -C(O)-O-, -O-C(O)-, -O-C(O)-O-, - $CR^0=CR^{00}$ - or - $C\equiv C$ - and in which one or more H atoms are optionally replaced by F, Cl, Br, I or CN, or denote aryl, heteroaryl, aryloxy, heteroaryloxy, arylcarbonyl, heteroarylcarbonyl, arylcarbonyloxy, heteroarylcarbonyloxy, aryloxycarbonyl or heteroaryloxycarbonyl having 4 to 30 ring atoms that is unsubstituted or substituted by one or more non-aromatic groups R^3 , wherein

R^3 is on each occurrence identically or differently F, Br, Cl, -CN, -NC, -NCO, -NCS, -OCN, -SCN, -C(O)NR⁰R⁰⁰, -C(O)X⁰, -C(O)R⁰, -NH₂, -NR⁰R⁰⁰, -SH, -SR⁰, -SO₃H, -SO₂R⁰, -OH, -NO₂, -CF₃, -SF₅, optionally substituted silyl, carbyl or hydrocarbyl with 1 to 40 C atoms that is optionally substituted and optionally comprises one or more hetero atoms, or P-Sp-,

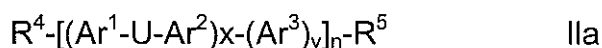
R^0 and R^{00} are independently of each other H or optionally substituted C_{1-40} carbyl or hydrocarbyl,

P is a polymerisable or crosslinkable group,

Sp is a spacer group or a single bond, and

X^0 is halogen.

3. Polymer according to claim 1 or claim 2, which is selected of formula IIa



wherein U, Ar^{1-3} , n, x and y have the meanings of claim 1, and

R^4 and R^5 have independently of each other one of the meanings of R^3 in claim 2, or denote $-CH_2Cl$, $-CHO$, $-CH=CH_2$, $-SiR'R''R'''$, $-SiX'X''R'$, $-SiR'R''X'$, $-SnR'R''R'''$, $-BR'R''$, $-B(OR')(OR'')$, $-B(OH)_2$, $O-SO_2-R'$, $-ZnX'$, $-C\equiv CH$, $-C\equiv C-SiR'R''R'''$ or $P-Sp-$, wherein P and Sp are as defined above, and R' , R'' and R''' have independently of each other one of the meanings of R^0 as defined in claim 2, and two of R' , R'' and R''' may also form a ring together with the hetero atom to which they are attached, and X' and X'' are halogen atoms.

4. Polymer according to claim 1 or 3, wherein Ar^1 and Ar^2 are independently of each other selected from the group consisting of, thiophene-2,5-diyl, thiazole-2,5-diyl, selenophene-2,5-diyl, furan-2,5-diyl, thieno[3,2-b]thiophene-2,5-diyl, thieno[2,3-b]thiophene-2,5-diyl, selenopheno[3,2-b]selenophene-2,5-diyl, selenopheno[2,3-b]selenophene-2,5-diyl, selenopheno[3,2-b]thiophene-2,5-diyl, and selenopheno[2,3-b]thiophene-2,5-diyl, all of which are unsubstituted, or mono- or polysubstituted with R^3 as defined in claim 2, and one of Ar^1 and Ar^2 may also denote a single bond.

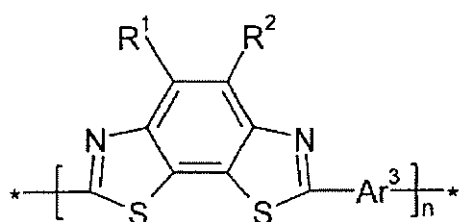
5. Polymer according to one or more of claims 1 to 4, wherein R^1 and/or R^2 are selected from the following groups:

a) the group consisting of primary alkyl or alkoxy with 1 to 30 C atoms, secondary alkyl or alkoxy with 3 to 30 C atoms, and tertiary alkyl or alkoxy with 4 to 30 C atoms, wherein in all these groups one or more H atoms are optionally replaced by F,

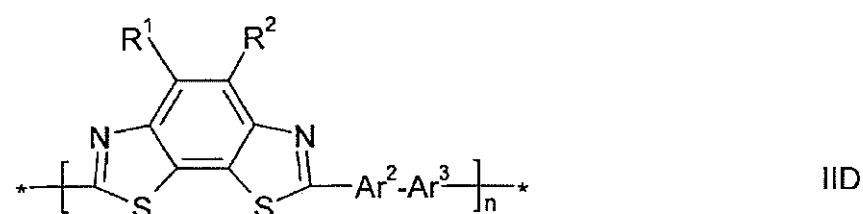
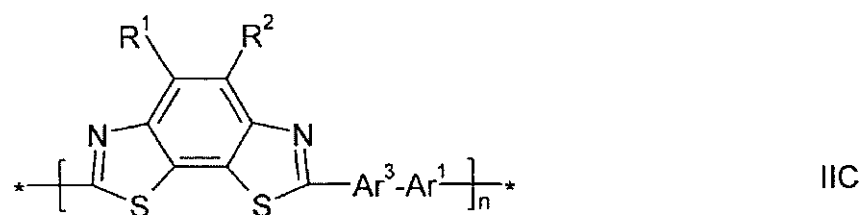
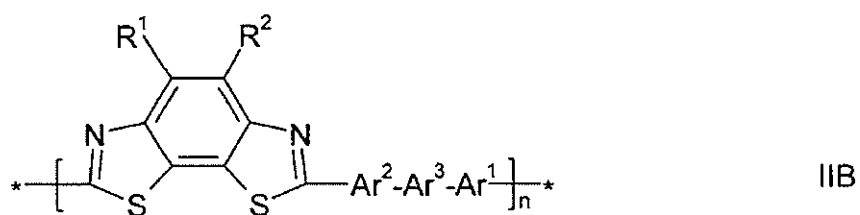
b) the group consisting of $-C(O)-R^6$, $-C(O)-O-R^6$, $-O-C(O)-R^6$, wherein R^6 is straight-chain, branched or cyclic alkyl with 1 to 30 C atoms, in which one or more non-adjacent C atoms are optionally replaced by $-O-$, $-S-$, $-C(O)-$, $-C(O)-O-$, $-O-C(O)-$, $-O-C(O)-O-$, $-CR^0=CR^{00}-$ or $-C\equiv C-$ and in which one or more H atoms are optionally replaced by F, Cl, Br, I or CN,

c) the group consisting of aryl, aryloxy, heteroaryl and heteroaryloxy that is optionally alkylated or alkoxyated and has 4 to 30 ring atoms.

6. Polymer according to one or more of claims 1 to 5, which is selected from the group consisting of the following subformulae:

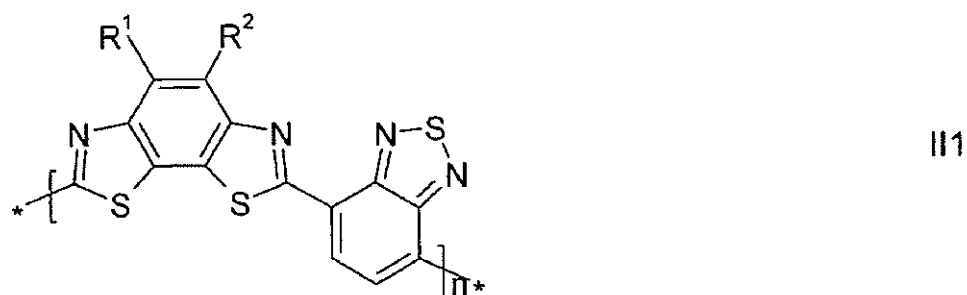


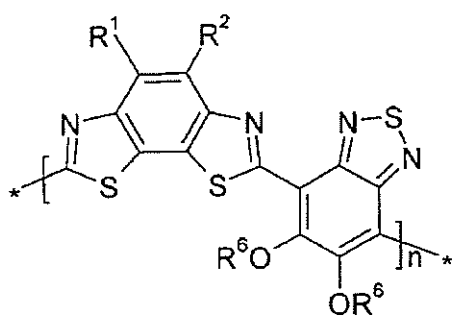
IIA



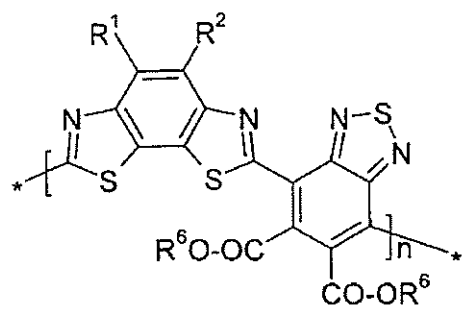
wherein R^1 , R^2 , Ar^1 , Ar^2 , Ar^3 and n have the meanings given in one or more of claims 1 to 5, and wherein Ar^1 , Ar^2 , Ar^3 do not denote a single bond.

7. Polymer according to one or more of claims 1 to 6, which is selected from the group consisting of the following subformulae:

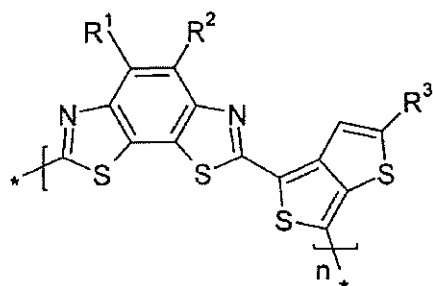




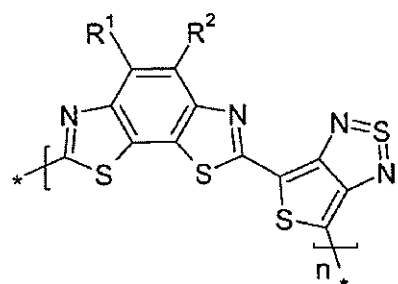
II2



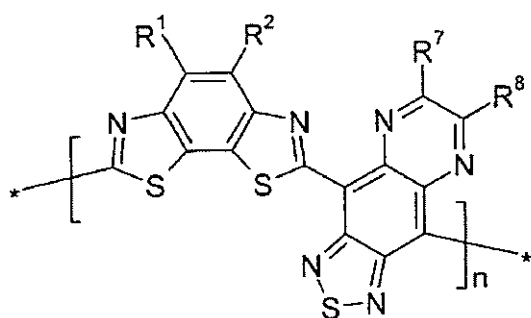
II3



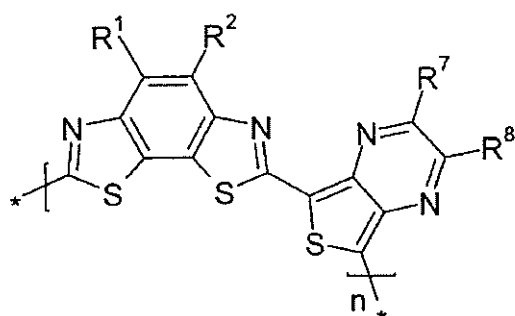
II4



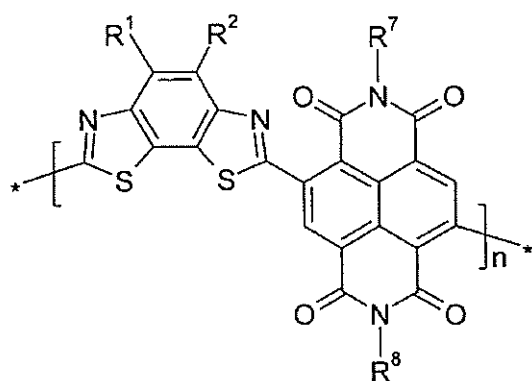
II5



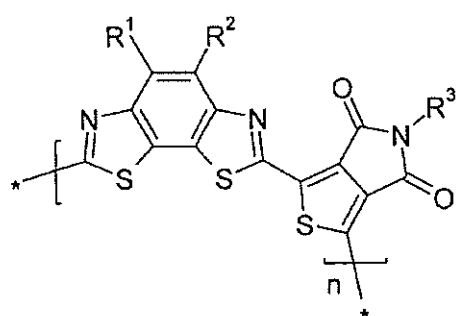
II6



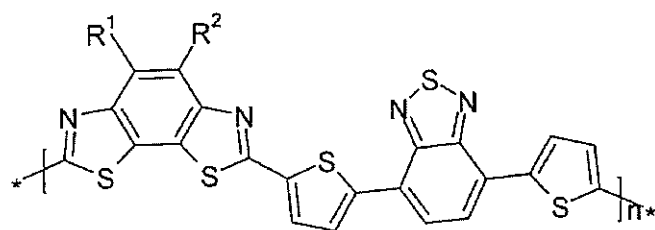
II7



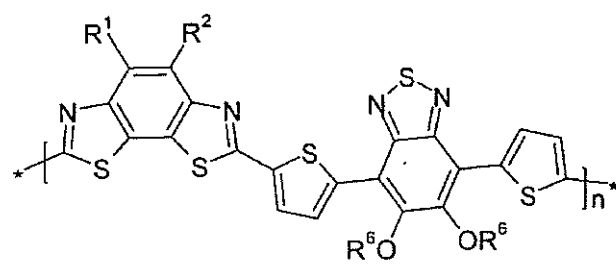
II8



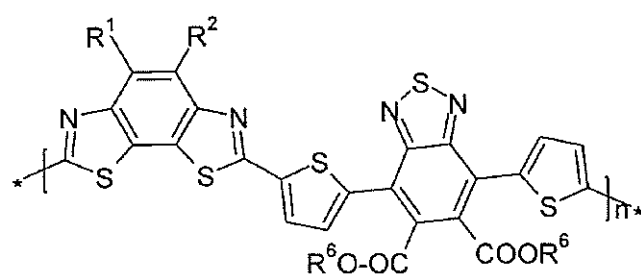
II9



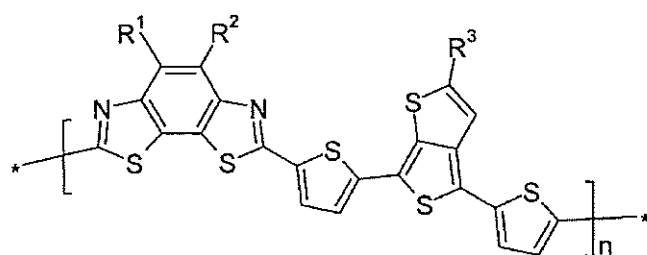
II10



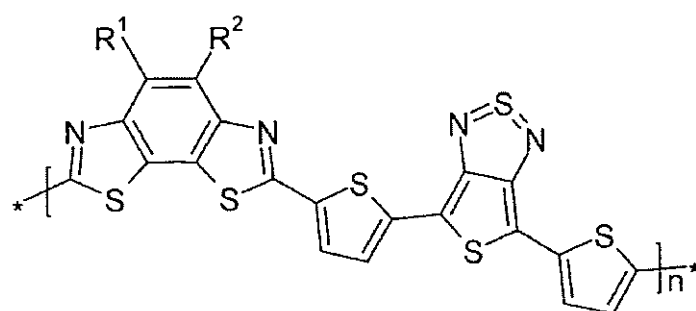
II11



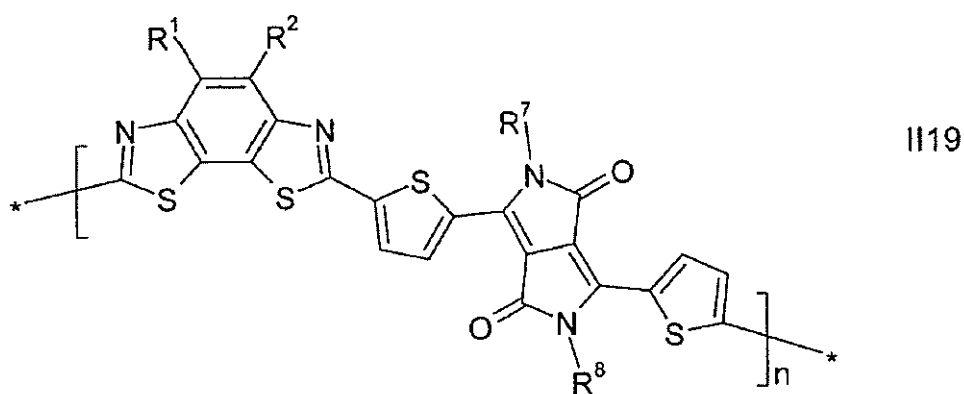
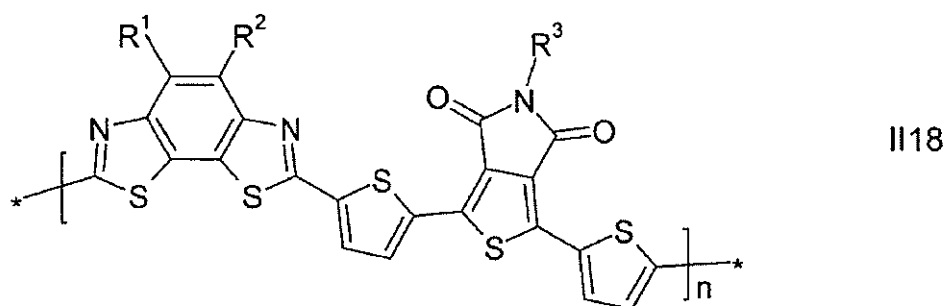
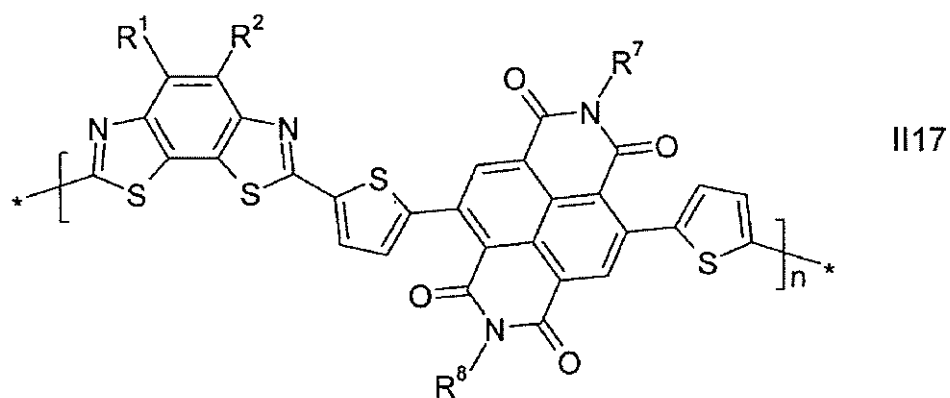
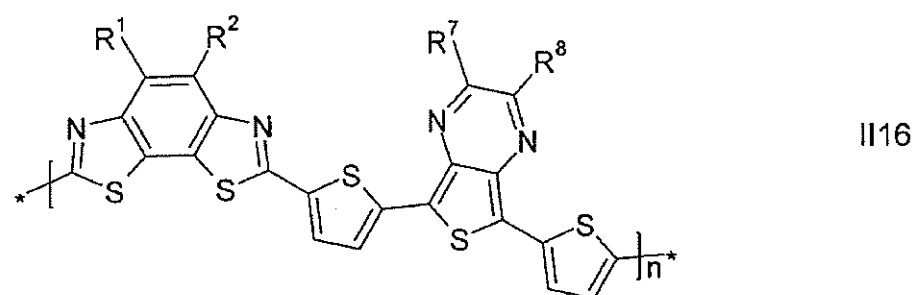
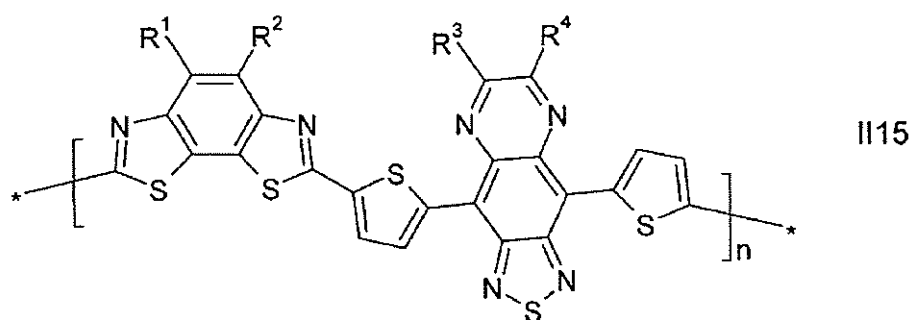
II12



II13



II14



wherein R^1 , R^2 , R^3 , R^6 and n have one of the meanings given in one or more of claims 1 to 7, and R^7 and R^8 have independently of each other one of the meanings of R^3 .

8. Polymer of the formula



wherein "chain" is a polymer chain selected from formulae IIA-IID and II1-II19 as defined in claim 6 or 7, and R^4 and R^5 have one of the meanings given in claim 3.

9. Mixture or blend comprising one or more polymers according to one or more of claims 1 to 8 and one or more compounds or polymers having semiconducting, charge transport, hole/electron transport, hole/electron blocking, electrically conducting, photoconducting or light emitting properties.

10. Formulation comprising one or more polymers, mixtures or blends according to one or more of claims 1 to 9, and one or more solvents, preferably selected from organic solvents.

11. Use of a polymer, mixture, blend or formulation according to one or more of claims 1 to 10 as charge transport, semiconducting, electrically conducting, photoconducting or light emitting material in optical, electrooptical, electronic, electroluminescent or photoluminescent components or devices.

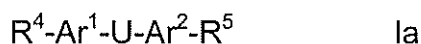
12. Optical, electrooptical or electronic component or device comprising one or more polymers, mixtures, blends or formulations according to one or more of claims 1 to 10.

13. Component or device according to claim 12, which is selected from the group consisting of organic field effect transistors (OFET), thin film transistors (TFT), integrated circuits (IC), logic circuits, capacitors, radio frequency identification (RFID) tags, devices or components, organic light emitting diodes (OLED), organic light

emitting transistors (OLET), flat panel displays, backlights of displays, organic photovoltaic devices (OPV), solar cells, laser diodes, photoconductors, photo-detectors, electrophotographic devices, electrophotographic recording devices, organic memory devices, sensor devices, charge injection layers, charge transport layers or interlayers in polymer light emitting diodes (PLEOs), Schottky diodes, planarising layers, antistatic films, polymer electrolyte membranes (PEM), conducting substrates, conducting patterns, electrode materials in batteries, alignment layers, biosensors, biochips, security markings, security devices, and components or devices for detecting and discriminating DNA sequences.

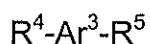
14. Component or device according to claim 12 or 13, which is an OFET or a bulk heterojunction OPV device.

15. Monomer of formula Ia



wherein U, Ar¹, Ar², R⁴ and R⁵ are as defined in one or more of claims 1 to 4.

16. Process of preparing a polymer according to one or more of claims 1 to 8, by coupling one or more monomers according to claim 15 with each other, and/or with one or more monomers of the formula



wherein R⁴, R⁵ and Ar³ are as defined in one or more of claims 1 to 4, in an aryl-aryl coupling reaction.