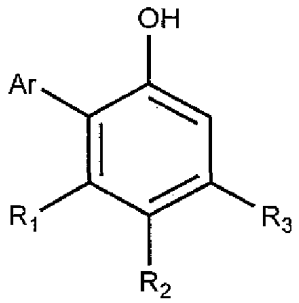


(IV)

$ArBR^b_2$ or $ArBF_3^-M^+$

(V)



(VI)

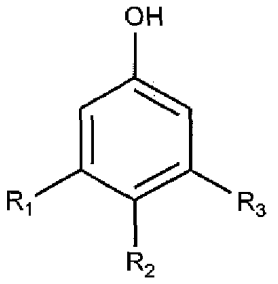
in the presence of a catalyst so as to yield a compound of formula (VI); and

b) treating the compound of formula (VI) with a source of halogen so as to yield the compound of formula (II);

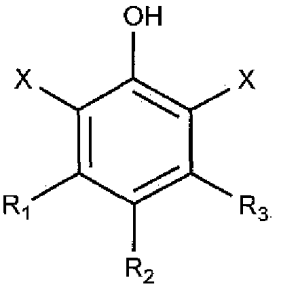
wherein X is halide; R^1, R^2, R^3, Ar, BR^b_2 and M^+ are as defined in claim 2; or

further comprising the steps of:

a) halogenating a compound of formula (VII) to yield a compound of formula (VIII); and



(VII)



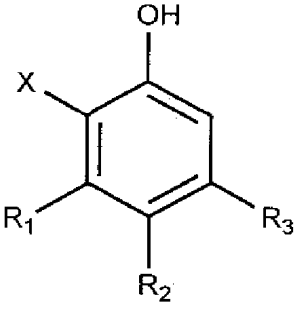
(VIII)

b) treating the compound of formula (VIII) with a compound of formula (V) in the presence of a catalyst to yield the compound of formula (II);

wherein X, R^1, R^2 and R^3 are as defined in claim 2.

4. A method according to claim 1 comprising the steps of:

a) treating a compound of formula (IV) with a compound of formula (V) in the presence of a catalyst so as to yield a compound of formula (VI);



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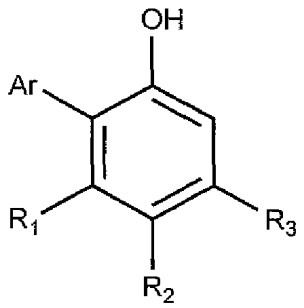


(VI)

b) treating the compound of formula (VI) with a source of halogen so as to yield the compound of formula (II); and

c) treating the unprotected phenol of formula (II) with a compound of formula (III) to yield the compound of formula (I);

wherein each of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} is independently selected from the group consisting of hydride, halide, optionally substituted hydrocarbyl, heteroatom-containing optionally substituted hydrocarbyl, alkoxy, aryloxy, silyl, boryl, dialkyl amino, alkylthio, arylthio and seleno; optionally two or more R groups can combine together into ring structures with such ring structures having from 3 to 100 non-hydrogen atoms in the ring; A is a bridging group having from one to 50 non-hydrogen atoms; Y and Y' are independently selected from O, S, NR^a and PR^a wherein R^a is optionally substituted hydrocarbyl; X is halide; Ar is optionally substituted aryl or optionally substituted heteroaryl; Z and Z' are independently selected from BR^b_2 and $BF_3^-M^+$, wherein R^b is independently selected from hydride, alkyl, hydroxy and alkoxy, wherein when both of R^b are alkoxy, optionally they may combine to form a ring structure of formula $BO_2R^b_2$, and wherein M^+ is an alkali metal cation.

5. A method according to claim 1 wherein each of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} is independently selected from the group consisting of hydride, halide, optionally substituted alkyl, heteroalkyl, aryl, heteroaryl, alkoxyl, aryloxyl, silyl, boryl, dialkylamino, alkylthio, arylthio, and seleno; or

wherein each of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} is independently selected from the group consisting of hydride, halide, optionally substituted alkyl, heteroalkyl, aryl, heteroaryl, alkoxyl, aryloxyl, silyl, dialkylamino, alkylthio, and arylthio; or

wherein each of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} is independently selected from the group consisting of hydride, and optionally substituted alkyl and aryl.

6. A method according to claim 1 wherein the bridging group A is selected from the group consisting of optionally substituted divalent hydrocarbyl and divalent heteroatom containing hydrocarbyl; or

wherein the bridging group A is selected from the group consisting of optionally substituted divalent alkyl, alkenyl, alkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, carbocycle, heterocarbocycle, aryl, heteroaryl and silyl; or

wherein the bridging group A is an optionally substituted divalent alkyl; or

wherein the bridging group A is represented by the general formula—$(QR^{15}_{2-z''})_{z'}$—wherein each Q is either carbon or silicon and each R^{15} may be the same or different from the others such that each R^{15} is selected from the group consisting of hydride and optionally substituted hydrocarbyl and heteroatom containing hydrocarbyl, and optionally two or more R^{15} groups may be joined into a ring structure having from 3 to 50 atoms in the ring structure not counting hydrogen atoms; z' is an integer from 1 to 10; and z'' is 0, 1 or 2.

7. A method according to claim 1 wherein Ar is selected from optionally substituted phenyl, naphthyl, biphenyl, anthracenyl, and phenanthrenyl; or

wherein Ar is selected from thiophene, pyridine, isoxazole, pyrazole, pyrrole, furan or benzo-fused analogues of these rings; or

wherein the catalyst comprises a nickel or palladium catalyst; or

wherein the palladium catalyst comprises a palladium phosphine catalyst; or

wherein the palladium catalyst comprises bis(tri-tert-butylphosphine)palladium, tetrakis(triphenylphosphine)palladium(0) ($Pd(PPh_3)_4$),

bis[1,2-bis(diphenylphosphino)ethane]palladium(0) ($Pd(dppe)_2$), 1,1'-bis(diphenylphosphino)ferrocene palladium (Pd(dppf)), or (2,2'-bis(diphenylphosphino)-1,1'-binaphthyl palladium (Pd(BINAP).

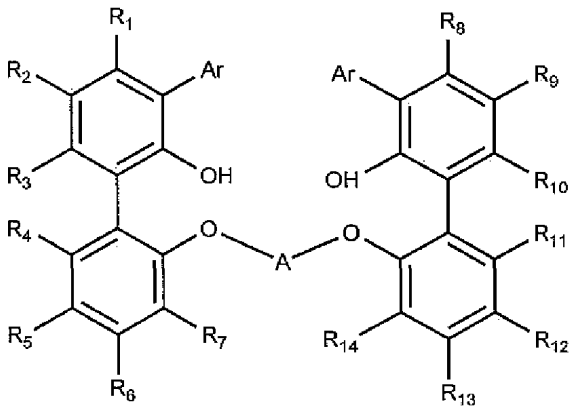
8. A method according to claim 2 wherein the catalyst further comprises a base,

wherein the base comprises an alkali metal carbonate, alkali metal phosphate, alkali metal hydroxide, alkali metal alkoxide or an amine; or

wherein X is bromo or chloro; or

wherein the compound of formula $ArBR^b_2$ or $ArBF_3^-M^+$ is selected from an optionally substituted arylborane, heteroarylborane, aryl boronic acid, heteroaryl boronic acid, aryl boronic ester, heteroaryl boronic ester, aryl trifluoroborate metal salt or heteroaryl trifluoroborate metal salt.

9. A method according to claim 1 wherein the ligand of formula (I) has formula (IX):



(IX)

wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, Ar and A are as defined in any one of the previous claims; or

wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} are selected from hydride and optionally substituted alkyl; Ar is selected from optionally substituted phenyl, naphthyl, biphenyl, anthracenyl, and phenanthrenyl; A is divalent alkyl.

10. A ligand of formula (I) or formula (IX) prepared by a method according to claim 1.