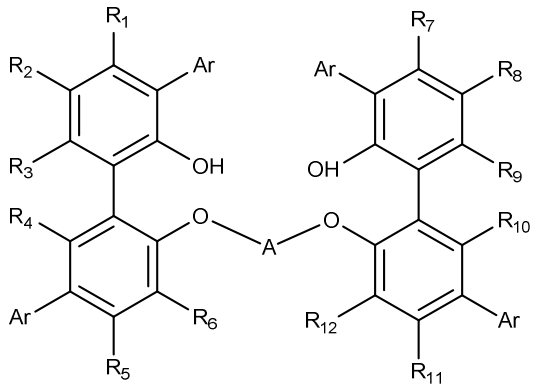


(II)

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} and R^{12} 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; Ar is, independently, optionally substituted aryl or optionally substituted heteroaryl.

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

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

wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11} and R^{12} are independently selected from the group consisting of hydride, and optionally substituted alkyl, heteroalkyl, aryl, and heteroaryl; or

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, aryl, heteroaryl and silyl; or

wherein the bridging group A is represented by the general formula—$(QR^{13}{}_{2-z''})_{z'}$—wherein each Q is either carbon or silicon and each R^{13} may be the same or different from the others such that each R^{13} is selected from the group consisting of hydride and optionally substituted hydrocarbyl and heteroatom containing hydrocarbyl, and optionally two or more R^{13} 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; or

wherein Ar is, independently, an optionally substituted aryl or heteroaryl; or

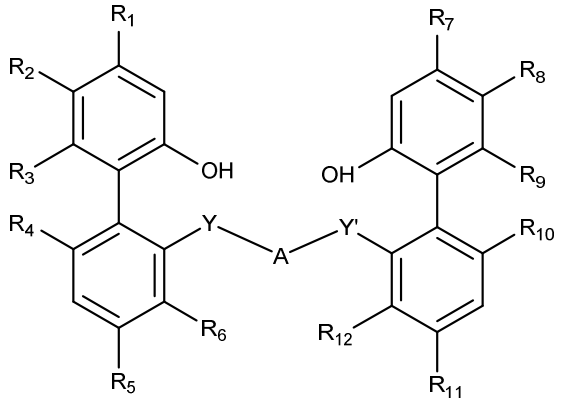
wherein Ar is, independently, an optionally substituted phenyl, naphthyl, biphenyl, anthracenyl or phenanthrenyl; or

wherein Ar is, independently, an optionally substituted thiophene, pyridine, isoxazole, pyrazole, pyrrole, furan, or benzo-fused analogues of these rings; or

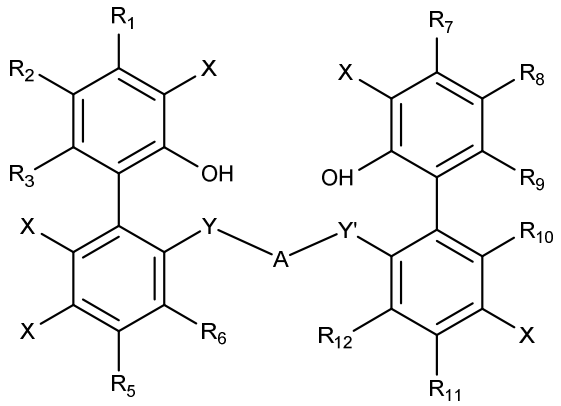
wherein each occurrence of Ar is the same.

4. A method of preparing a bridged bi-aromatic phenol ligand according to claim 1 comprising the steps of:

a) treating a bridged bi-aromatic phenol of formula (III) with a source of halogen to yield a tetrahalo bridged bi-aromatic phenol of formula (IV); and



(III)



(IV)

b) treating the tetrahalo bridged bi-aromatic phenol of formula (IV) with an aryl-boron compound ($ArBR^b_2$ or $ArBF_3^-M^+$) in the presence of a catalyst, to yield the bridged bi-aromatic phenol ligand 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} and R^{12} 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; Ar is, independently, optionally substituted aryl or optionally substituted heteroaryl; X is halo; 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 4 wherein the catalyst comprises palladium or nickel; or

wherein the catalyst is a palladium phosphine catalyst; or

wherein the catalyst further comprises a base; or.

wherein the catalyst further comprises a base that is an alkali metal carbonate or alkali metal phosphate; or

wherein X is bromo or chloro; or

wherein the aryl-boron compound is an optionally substituted aryl boronic acid, an optionally substituted heteroaryl boronic acid, an optionally substituted aryl boronic ester, an optionally substituted heteroaryl boronic ester, an optionally substituted aryl trifluoroborate, an optionally substituted heteroaryl trifluoroborate, an optionally substituted aryl borane or an optionally substituted heteroaryl borane.

6. A transition metal compound comprising a ligand according to claim 1; or
a transition metal compound according to any one of claims 1 to 5 comprising a titanium, a zirconium or a hafnium atom.

7. A catalyst composition comprising one or more transition metal compounds according to claim 6 and one or more activators; or a supported catalyst composition comprising one or more transition metal compounds according to claim 6, one or more activators and one or more support materials.

8. A catalyst composition or supported catalyst composition according to claim 7 wherein the one or more activators is methylalumoxane.

9. A catalyst composition or supported catalyst composition according claim 7 further comprising one or more other transition metal compounds.

10. A process for polymerizing olefins, the process comprising:
contacting olefins with one or more catalyst compositions or supported catalyst compositions according to any one of claims 7 to 9 in a reactor under polymerization conditions to produce an olefin polymer or copolymer.