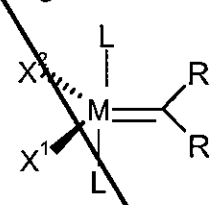
WHAT IS CLAIMED IS:

1. An optionally hydrogenated nitrile rubber having a weight average molecular weight M_w of 50,000 g/mol or less and a polydispersity index of less than 2.0.

2. A process for preparing an optionally hydrogenated nitrile rubber according to claim 1, comprising subjecting a nitrile rubber to a molecular weight degradation via a metathesis reaction in the presence of a homogeneous catalyst and optionally a co-olefin, as well as in the presence of a solvent, wherein the metathesis is carried out in the presence of at least one transition metal complex catalyst, wherein the optionally hydrogenated nitrile rubber is isolated from the solvent through a process where the rubber is contacted with a mechanical degassing device.

3. The process according to Claim 2, wherein the at least one transition metal complex catalyst is selected from the group consisting of

(i) a compound of the general formula (I),



(I)

where

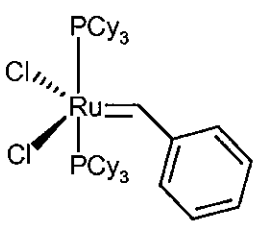
M is osmium or ruthenium,

the radicals R are identical or different and are each an alkyl, preferably C_1-C_{30}-alkyl, cycloalkyl, preferably C_3-C_{20}-cycloalkyl, alkenyl, preferably C_2-C_{20}-alkenyl, alkynyl, preferably C_2-C_{20}-alkynyl, aryl, preferably C_6-C_{24}-aryl, carboxylate, preferably C_1-C_{20}-carboxylate, alkoxy, preferably C_1-C_{20}-alkoxy, alkenyloxy, preferably C_2-C_{20}-alkenyloxy, alkynyloxy, preferably C_2-C_{20}-alkynyloxy, aryloxy, preferably C_6-C_{24}-aryloxy, alkoxycarbonyl, preferably C_2-C_{20}-alkoxycarbonyl, alkylamino, preferably C_1-C_{30}-alkylamino, alkylthio, preferably C_1-C_{30}-alkylthio, arylthio, preferably C_6-C_{24}-arylthio, alkylsulphonyl, preferably C_1-C_{20}-alkylsulphonyl, or alkylsulphinyl, preferably C_1-C_{20}-alkylsulphinyl radical, each of which may optionally be substituted by one or more alkyl, halogen, alkoxy, aryl or heteroaryl radicals,

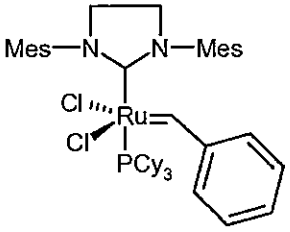
X^1 and X^2 are identical or different and are two ligands, preferably anionic ligands, and

L represents identical or different ligands, preferably uncharged electron donors;

(ii) a compound having the structure (III) or (IV), where Cy is in each case cyclohexyl;

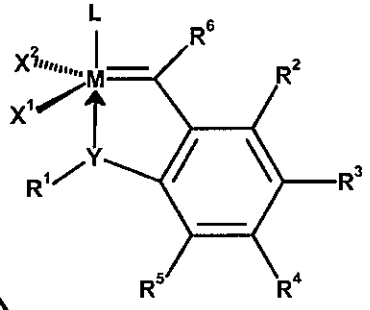


(III)



(IV)

(iii) a compound of the general formula (V),



(V)

where

M is ruthenium or osmium,

Y is oxygen (O), sulphur (S), an N-R^1 radical or a P-R^1 radical,

X^1 and X^2 are identical or different ligands,

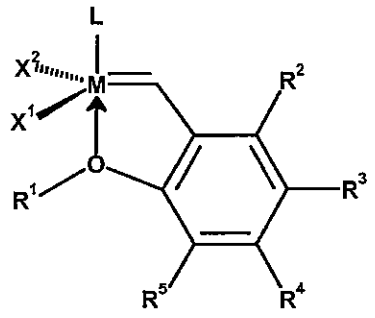
R^1 is an alkyl, cycloalkyl, alkenyl, alkynyl, aryl, alkoxy, alkenyloxy, alkynyloxy, aryloxy, alkoxycarbonyl, alkylamino, alkylthio, arylthio, alkylsulphonyl or alkylsulphynyl radical, each of which may optionally be substituted by one or more alkyl, halogen, alkoxy, aryl or heteroaryl radicals,

R^2, R^3, R^4 and R^5 are identical or different and are each hydrogen, organic or inorganic radicals,

R^6 is hydrogen or an alkyl, alkenyl, alkynyl or aryl radical and

L represents identical or different ligands, preferably uncharged electron donors;

(iv) a compound of the general formula (VI),

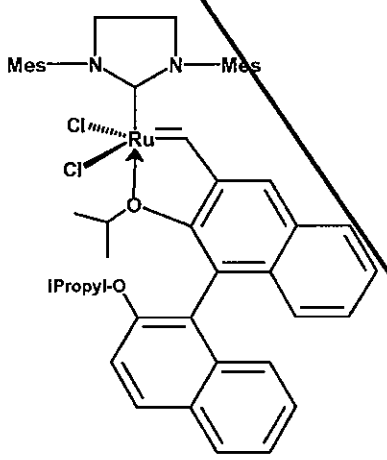


(VI)

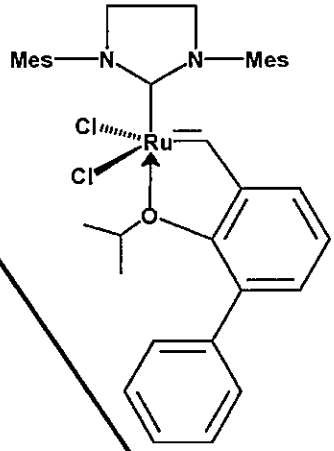
where

M, L, X^1, X^2, R^1, R^2, R^3, R^4 and R^5 have the meanings given for the general formula (V) mentioned under (iii);

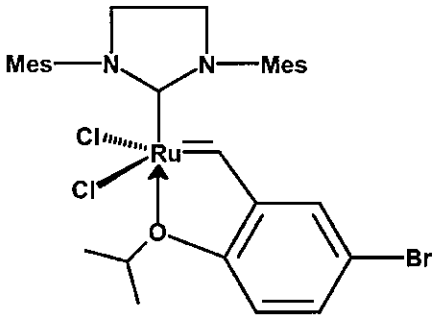
(v) a compound of the following structures (VIII), (IX), (X), (XI), (XII), (XIII), (XIV) or (XV), where Mes is in each case a 2,4,6-trimethylphenyl radical,



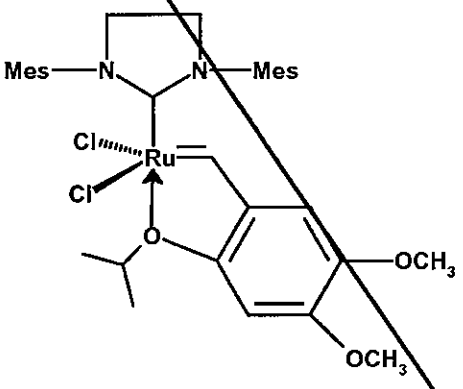
(VIII)



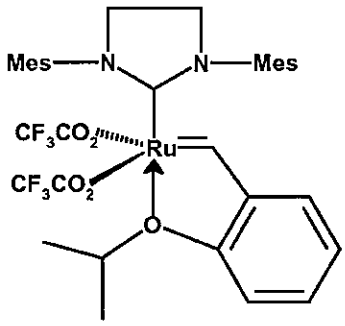
(IX)



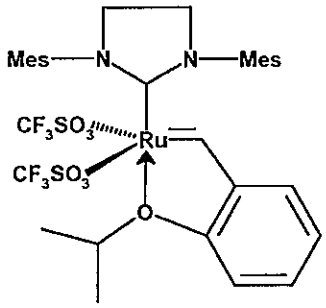
(X)



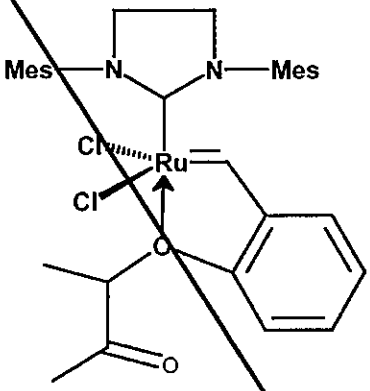
(XI)



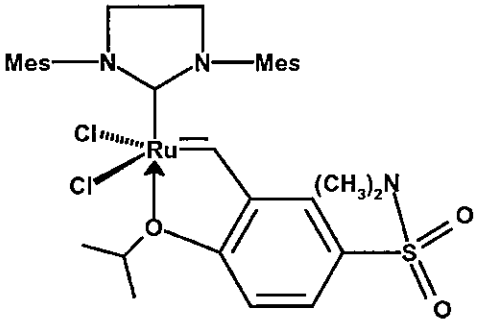
(XII)



(XIII)

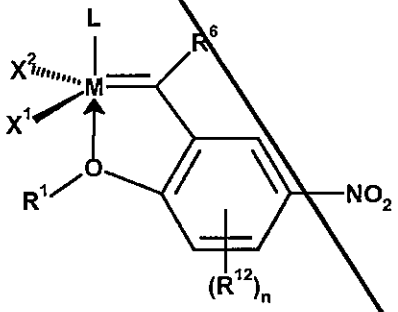


(XIV)



(XV)

(vi) a compound of the general formula (XVI)



(XVI)

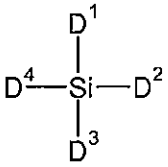
where

M, L, X^1, X^2, R^1 and R^6 have the meanings given for the general formula (V) in Claim 8,

the radicals R^{12} are identical or different and have the meanings given for the radicals R^2, R^3, R^4 and R^5 in the general formula (V) in Claim 8, with the exception of hydrogen, and

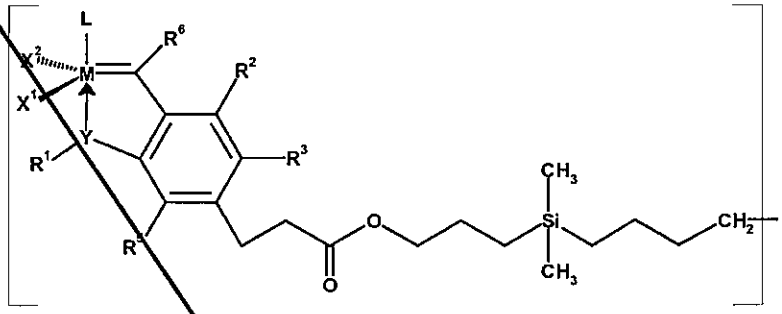
n is 0, 1, 2 or 3;

(vii) a compound of the general formula (XIX),



(XIX)

where D^1, D^2, D^3 and D^4 each have a structure of the general formula (XX) below which is bound via the methylene group to the silicon of the formula (XIX),

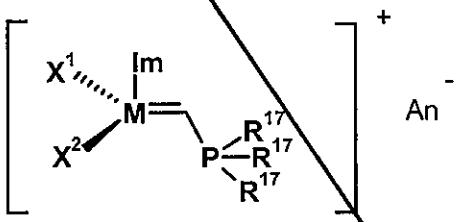


(XX)

where

M, L, X^1, X^2, R^1, R^2, R^3, R^5 and R^6 have the meanings given for the general formula (V) in (iii);

(viii) a compound of the general formula (XXV)



(XXV)

where

M is ruthenium or osmium,

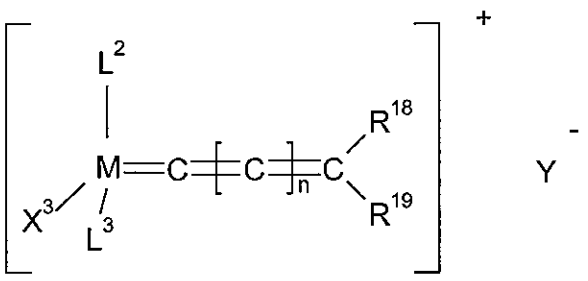
X^1 and X^2 are identical or different and are anionic ligands,

the radicals R^{17} are identical or different and are organic radicals,

Im is a substituted or unsubstituted imidazolidine radical and

An is an anion;

(ix) a compound of the general formula (XXVI)



(XXVI)

where

M is ruthenium or osmium,

R^{18} and R^{19} are each, independently of one another, hydrogen, C_1-C_{20}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_1-C_{20}-alkylsulphonyl or C_1-C_{20}-alkylsulphinyl,

X^3 is an anionic ligand,

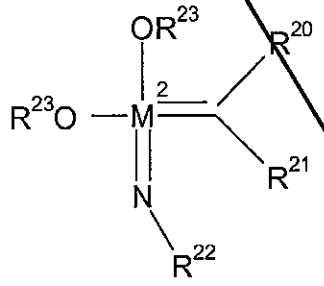
L^2 is an uncharged π-bonded ligand, whether or not it is monocyclic or polycyclic,

L^3 is a ligand from the group of phosphines, sulphonated phosphines, fluorinated phosphines, functionalized phosphines having up to three aminoalkyl, ammonioalkyl, alkoxyalkyl, alkoxycarbonylalkyl, hydrocarbonylalkyl, hydroxyalkyl or ketoalkyl groups, phosphites, phosphinites, phosphonites, phosphine amines, arsines, stibines, ethers, amines, amides, imines, sulphoxides, thioethers and pyridines,

Y^- is a noncoordinating anion and

n is 0, 1, 2, 3, 4 or 5;

(x) a compound of the general formula (XXVII)



(XXVII)

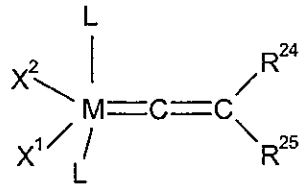
where

M^2 is molybdenum or tungsten,

R^{20} and R^{21} are identical or different and are each hydrogen, C_1-C_{20}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_1-C_{20}-alkylsulphonyl or C_1-C_{20}-alkylsulphinyl,

R^{22} and R^{23} are identical or different and are each a substituted or halogen-substituted C_1-C_{20}-alkyl, C_6-C_{24}-aryl, C_6-C_{30}-aralkyl radical or a silicone-containing analogue thereof;

(xi) a compound of the general formula (XXVIII)



(XXVIII)

where

M is ruthenium or osmium,

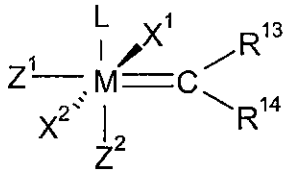
X^1 and X^2 are identical or different and are anionic ligands which can assume all the meanings of X^1 and X^2 in the general formulae (A) and (B),

L are identical or different ligands which can assume all the meanings of L in the general formulae (I) and (V),

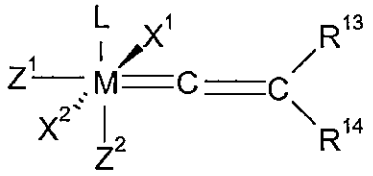
R^{24} and R^{25} are identical or different and are each hydrogen or substituted or unsubstituted alkyl;

and

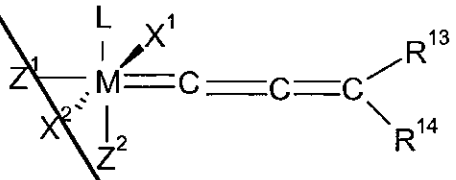
(xii) a compound of the general formula (XXI), (XXII) or (XXIII),



(XXI)



(XXII)



(XXIII)

where

M is ruthenium or osmium,

X^1 and X^2 are identical or different ligands, preferably anionic ligands,

Z^1 and Z^2 are identical or different and neutral electron donor ligands,

R^{13} and R^{14} are identical or different and hydrogen or a substituent selected from the group consisting of alkyl, cycloalkyl, alkenyl, alkynyl, aryl, carboxylate, alkoxy, alkenyloxy, alkynyloxy, aryloxy, alkoxycarbonyl, alkylamino, dialkylamino, alkylthio, arylthio, alkylsulphonyl and alkylsulphinyl radical, each of which may optionally be substituted by one or more substituents, preferably alkyl, halogen, alkoxy, aryl or heteroaryl radicals, and

L is a ligand.

4. The process according to claim 3, wherein in the compound of the general formula (VI)

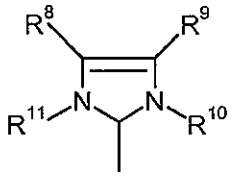
M is ruthenium,

X^1 and X^2 are both halogen, in particular, both chlorine,

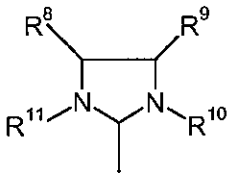
R^1 is a straight-chain or branched C_1-C_{12}-alkyl radical, preferably an isopropyl radical,

R^2, R^3, R^4, R^5 have the meanings given for the general formula (V), preferably R^2, R^3, R^4, R^5 are all hydrogen, and

L has the general and preferred meanings given for the general formula (V), preferably, L is a substituted or unsubstituted imidazolidine radical of the formula (IIa) or (IIb),



(IIa)

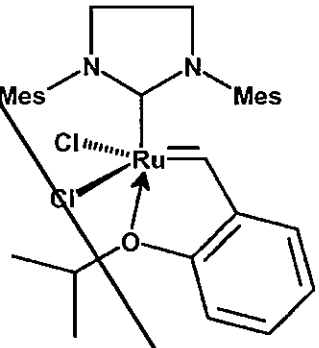


(IIb)

where

R^8, R^9, R^{10}, R^{11} are identical or different and are each hydrogen, straight-chain or branched C_1-C_{30}-alkyl, C_3-C_{20}-cycloalkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphonate, C_6-C_{24}-arylsulphonate or C_1-C_{20}-alkylsulphinyl.

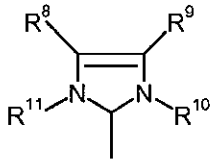
5. The process according to claim 4, wherein the compound of the formula (VI) has the following formula (VII), where Mes is in each case a 2,4,6-trimethylphenyl radical;



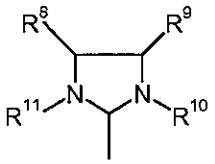
(VII)

6. The process according to claim 3, wherein in the compound of the general formula (XVI)

M	is ruthenium,
X^1 and X^2	are both halogen, in particular both chlorine,
R^1	is a straight-chain or branched C_1-C_{12}-alkyl radical, preferably an isopropyl radical,
R^{12}	has the meanings given for the general formula (V),
n	is 0, 1, 2 or 3, preferably 0,
R^6	is hydrogen and
L	has the meanings given for the general formula (V), preferably, L is a substituted or unsubstituted imidazolidine radical of the formula (IIa) or (IIb),



(IIa)

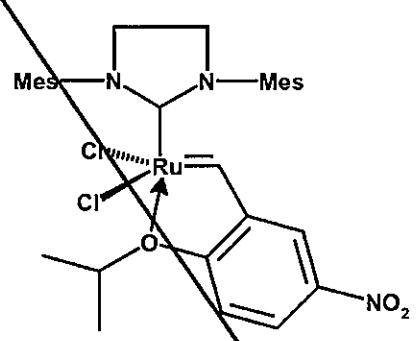


(IIb)

where

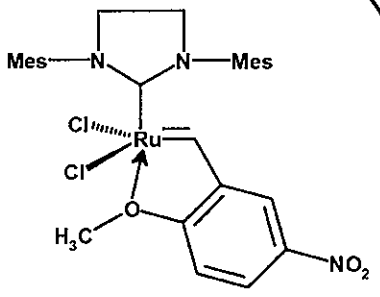
R^8, R^9, R^{10}, R^{11} are identical or different and are each hydrogen, straight-chain or branched, cyclic or acyclic C_1-C_{30}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphonate, C_6-C_{24}-arylsulphonate or C_1-C_{20}-alkylsulphinyl.

7. The process according to claim 6, wherein the compound of the general formula (XVI) has the structure (XVII)



(XVII)

8. The process according to claim 6, wherein the compound of the general formula (XVI) has the structure (XVIII), where Mes is in each case a 2,4,6-trimethylphenyl radical



(XVIII)

9. The process according to claim 3, wherein in the compound of the general formula (XXI)

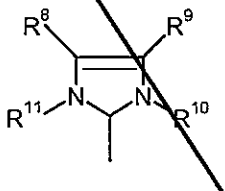
M is ruthenium,

X^1 and X^2 are both halogen, in particular, both chlorine,

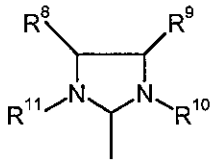
Z^1 and Z^2 are identical or different and represent five- or six-membered monocyclic groups containing 1 to 4, preferably 1 to 3, most preferably 1 or 2 heteroatoms, or bicyclic or polycyclic structures composed of 2, 3, 4 or 5 such five- or six-membered monocyclic groups wherein all aforementioned groups are optionally substituted by one or more alkyl, preferably C_1-C_{10}-alkyl, cycloalkyl, preferably C_3-C_8-cycloalkyl, alkoxy, preferably C_1-C_{10}-alkoxy, halogen, preferably chlorine or bromine, aryl, preferably C_6-C_{24}-aryl, or heteroaryl, preferably C_5-C_{23} heteroaryl radicals, or Z^1 and Z^2 together represent a bidentate ligand, thereby forming a cyclic structure,

R^{13} and R^{14} are identical or different and are each C_1-C_{30}-alkyl C_3-C_{20}-cycloalkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{30}-alkylamino, C_1-C_{30}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphinyl, each of which may optionally be substituted by one or more alkyl, halogen, alkoxy, aryl or heteroaryl radicals, and

L is a substituted or unsubstituted imidazolidine radical of the formula (IIa) or (IIb),



(IIa)

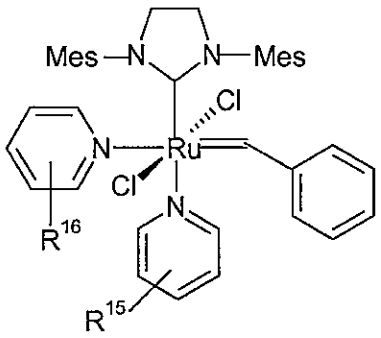


(IIb)

where

R^8, R^9, R^{10}, R^{11} are identical or different and are each hydrogen, straight-chain or branched, cyclic or acyclic C_1-C_{30}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphonate, C_6-C_{24}-arylsulphonate or C_1-C_{20}-alkylsulphinyl.

10. The process according to claim 9, wherein the compound of the general formula (XXI) has the formula (XXIV)

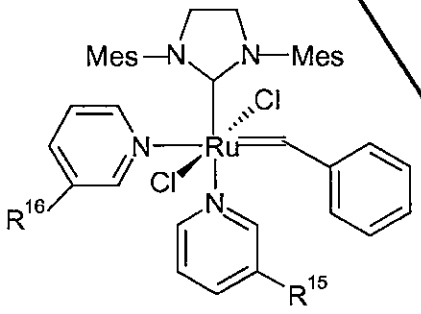


(XXIV)

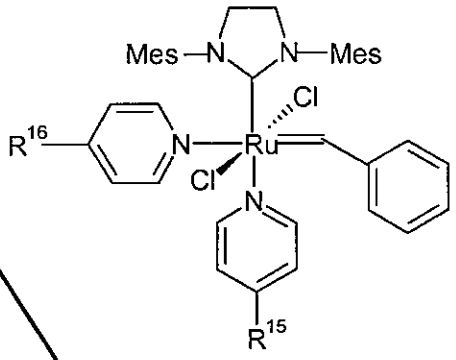
where

R^{15}, R^{16} are identical or different and represent halogen, straight-chain or branched C_1-C_{20} alkyl, C_1-C_{20} heteroalkyl, C_1-C_{10} haloalkyl, C_1–C_{10} alkoxy, C_6-C_{24} aryl, preferably phenyl, formyl, nitro, nitrogen heterocycles, preferably pyridine, piperidine and pyrazine, carboxy, alkylcarbonyl, halocarbonyl, carbamoyl, thiocarbomoyl, carbamido, thioformyl, amino, trialkylsilyl und trialkoxysilyl.

11. The process according to claim 10, wherein the compound of the general formula (XXVI) has the formula (XXIVa) or (XXIVb), wherein R^{15} and R^{16} have the same meaning as given for structural formula (XXIV)



(XXIVa)



(XXIVb)

12. The process according to any one of claims 2 to 11, wherein nitrile rubber is a copolymer of acrylonitrile and 1,3-butadiene.

13. The process according to any one of claims 3 to 14 in which the mechanical degassing device is a single-, twin- or multi-screw extruder, preferably a twin screw extruder.

14. A polymer composite comprising at least one optionally hydrogenated nitrile rubber as claimed in claim 1, at least one cross-linking agent and/or curing system, optionally at least one filler and optionally further auxiliary products for rubbers, preferably reaction accelerators, vulcanization accelerators, vulcanization acceleration auxiliaries, antioxidants, foaming agents, anti-aging agents, heat stabilizers, light stabilizers, ozone stabilizers,

processing aids, plasticizers, tackifiers, blowing agents, dyestuffs, pigments, waxes extenders, organic acids, inhibitors, metal oxides, and activators.

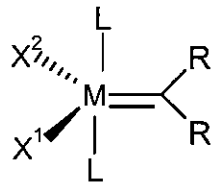
15. A shaped article comprising an optionally hydrogenated nitrile rubber according to claim 1 or a composite according to claim 14.

WHAT IS CLAIMED IS:

1. A process for preparing an optionally hydrogenated nitrile rubber having a weight average molecular weight Mw of 50,000 g/mol or less and a polydispersity index of less than 2.0, comprising subjecting a nitrile rubber to a molecular weight degradation via a metathesis reaction in the presence of a homogeneous catalyst and optionally a co-olefin, as well as in the presence of a solvent, wherein the metathesis is carried out in the presence of at least one transition metal complex catalyst, wherein the optionally hydrogenated nitrile rubber is isolated from the solvent through a process where the rubber is contacted with a mechanical degassing device.

2. The process according to Claim 1, wherein the at least one transition metal complex catalyst is selected from the group consisting of

(i) a compound of the general formula (I),



(I)

where

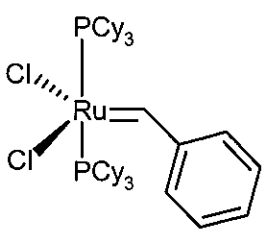
M is osmium or ruthenium,

the radicals R are identical or different and are each an alkyl, preferably C_1-C_{30}-alkyl, cycloalkyl, preferably C_3-C_{20}-cycloalkyl, alkenyl, preferably C_2-C_{20}-alkenyl, alkynyl, preferably C_2-C_{20}-alkynyl, aryl, preferably C_6-C_{24}-aryl, carboxylate, preferably C_1-C_{20}-carboxylate, alkoxy, preferably C_1-C_{20}-alkoxy, alkenyloxy, preferably C_2-C_{20}-alkenyloxy, alkynyloxy, preferably C_2-C_{20}-alkynyloxy, aryloxy, preferably C_6-C_{24}-aryloxy, alkoxycarbonyl, preferably C_2-C_{20}-alkoxycarbonyl, alkylamino, preferably C_1-C_{30}-alkylamino, alkylthio, preferably C_1-C_{30}-alkylthio, arylthio, preferably C_6-C_{24}-arylthio, alkylsulphonyl, preferably C_1-C_{20}-alkylsulphonyl, or alkylsulphinyl, preferably C_1-C_{20}-alkylsulphinyl radical, each of which may optionally be substituted by one or more alkyl, halogen, alkoxy, aryl or heteroaryl radicals,

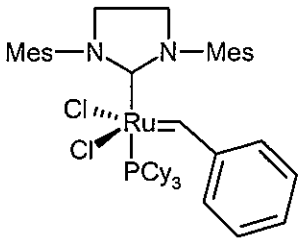
X^1 and X^2 are identical or different and are two ligands, preferably anionic ligands, and

L represents identical or different ligands, preferably uncharged electron donors;

(ii) a compound having the structure (III) or (IV), where Cy is in each case cyclohexyl;

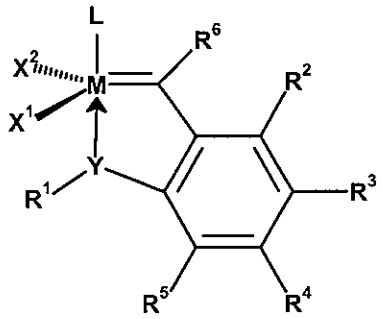


(III)



(IV)

(iii) a compound of the general formula (V),



(V)

where

M is ruthenium or osmium,

Y is oxygen (O), sulphur (S), an N-R^1 radical or a P-R^1 radical,

X^1 and X^2 are identical or different ligands,

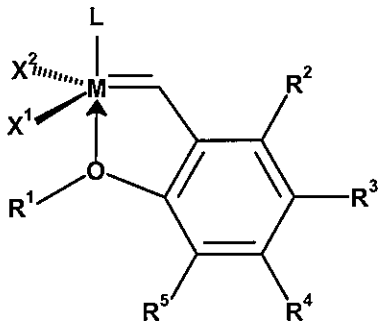
R^1 is an alkyl, cycloalkyl, alkenyl, alkynyl, aryl, alkoxy, alkenyloxy, alkynyloxy, aryloxy, alkoxycarbonyl, alkylamino, alkylthio, arylthio, alkylsulphonyl or alkylsulphynyl radical, each of which may optionally be substituted by one or more alkyl, halogen, alkoxy, aryl or heteroaryl radicals,

R^2, R^3, R^4 and R^5 are identical or different and are each hydrogen, organic or inorganic radicals,

R^6 is hydrogen or an alkyl, alkenyl, alkynyl or aryl radical and

L represents identical or different ligands, preferably uncharged electron donors;

(iv) a compound of the general formula (VI),

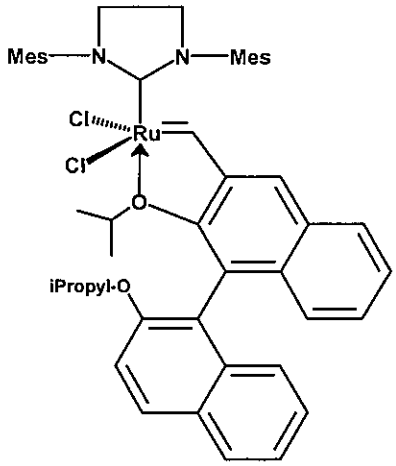


(VI)

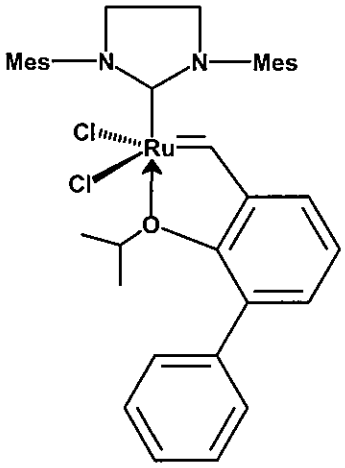
where

M, L, X^1, X^2, R^1, R^2, R^3, R^4 and R^5 have the meanings given for the general formula (V) mentioned under (iii);

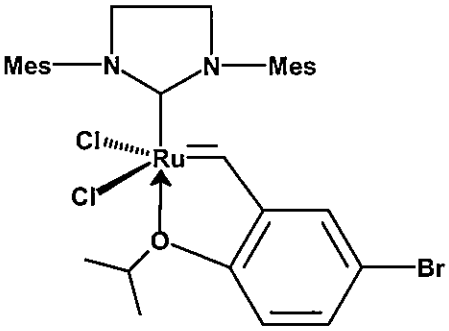
(v) a compound of the following structures (VIII), (IX), (X), (XI), (XII), (XIII), (XIV) or (XV), where Mes is in each case a 2,4,6-trimethylphenyl radical,



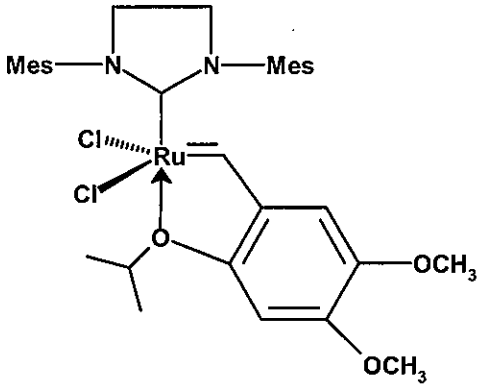
(VIII)



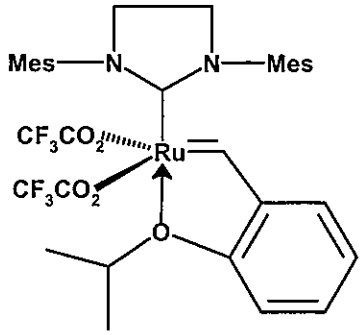
(IX)



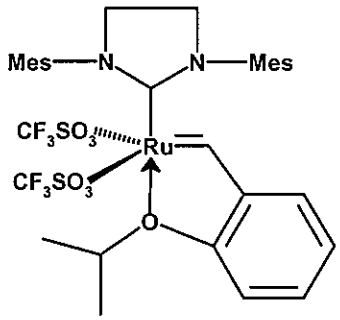
(X)



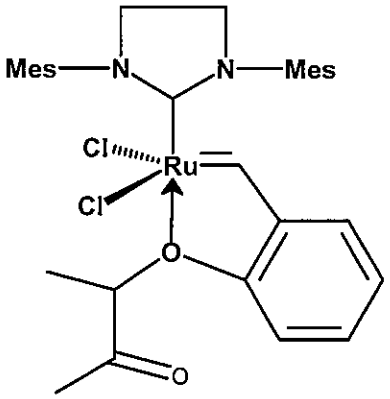
(XI)



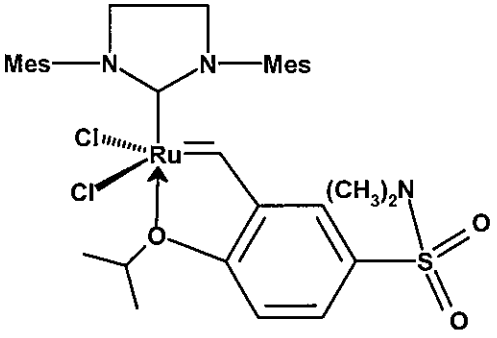
(XII)



(XIII)

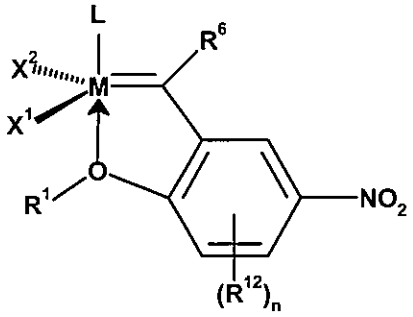


(XIV)



(XV)

(vi) a compound of the general formula (XVI)



(XVI)

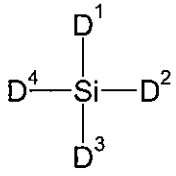
where

M, L, X^1, X^2, R^1 and R^6 have the meanings given for the general formula (V) in Claim 8,

the radicals R^{12} are identical or different and have the meanings given for the radicals R^2, R^3, R^4 and R^5 in the general formula (V) in Claim 8, with the exception of hydrogen, and

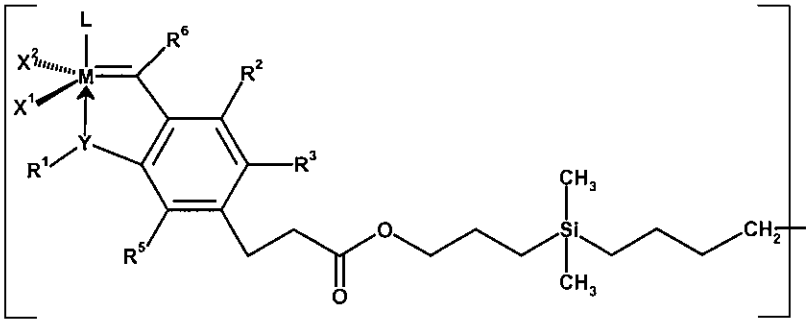
n is 0, 1, 2 or 3;

(vii) a compound of the general formula (XIX),



(XIX)

where D^1, D^2, D^3 and D^4 each have a structure of the general formula (XX) below which is bound via the methylene group to the silicon of the formula (XIX),

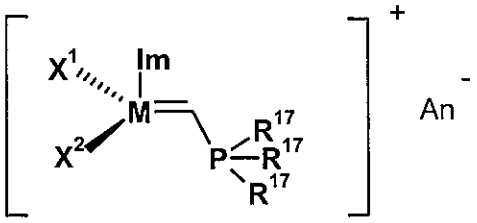


(XX)

where

M, L, X^1, X^2, R^1, R^2, R^3, R^5 and R^6 have the meanings given for the general formula (V) in (iii);

(viii) a compound of the general formula (XXV)



(XXV)

where

M is ruthenium or osmium,

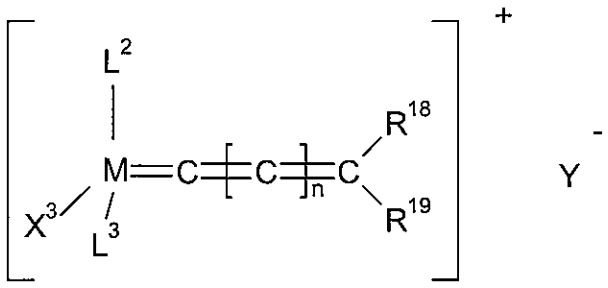
X^1 and X^2 are identical or different and are anionic ligands,

the radicals R^{17} are identical or different and are organic radicals,

Im is a substituted or unsubstituted imidazolidine radical and

An is an anion;

(ix) a compound of the general formula (XXVI)



(XXVI)

where

M is ruthenium or osmium,

R^{18} and R^{19} are each, independently of one another, hydrogen, C_1-C_{20}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_1-C_{20}-alkylsulphonyl or C_1-C_{20}-alkylsulphinyl,

X^3 is an anionic ligand,

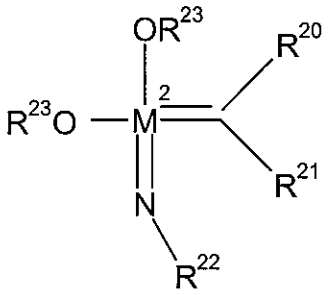
L^2 is an uncharged π-bonded ligand, whether or not it is monocyclic or polycyclic,

L^3 is a ligand from the group of phosphines, sulphonated phosphines, fluorinated phosphines, functionalized phosphines having up to three aminoalkyl, ammonioalkyl, alkoxyalkyl, alkoxycarbonylalkyl, hydrocarbonylalkyl, hydroxyalkyl or ketoalkyl groups, phosphites, phosphinites, phosphonites, phosphine amines, arsines, stibines, ethers, amines, amides, imines, sulphoxides, thioethers and pyridines,

Y^- is a noncoordinating anion and

n is 0, 1, 2, 3, 4 or 5;

(x) a compound of the general formula (XXVII)



(XXVII)

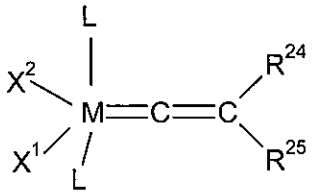
where

M^2 is molybdenum or tungsten,

R^{20} and R^{21} are identical or different and are each hydrogen, C_1-C_{20}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_1-C_{20}-alkylsulphonyl or C_1-C_{20}-alkylsulphinyl,

R^{22} and R^{23} are identical or different and are each a substituted or halogen-substituted C_1-C_{20}-alkyl, C_6-C_{24}-aryl, C_6-C_{30}-aralkyl radical or a silicone-containing analogue thereof;

(xi) a compound of the general formula (XXVIII)



(XXVIII)

where

M is ruthenium or osmium,

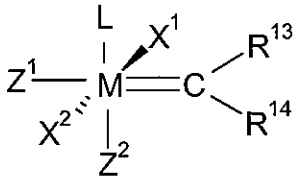
X^1 and X^2 are identical or different and are anionic ligands which can assume all the meanings of X^1 and X^2 in the general formulae (A) and (B),

L are identical or different ligands which can assume all the meanings of L in the general formulae (I) and (V),

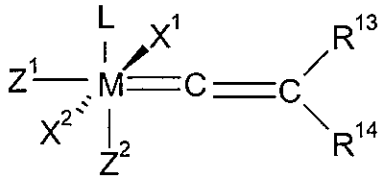
R^{24} and R^{25} are identical or different and are each hydrogen or substituted or unsubstituted alkyl;

and

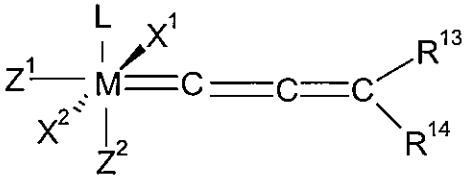
(xii) a compound of the general formula (XXI), (XXII) or (XXIII),



(XXI)



(XXII)



(XXIII)

where

M is ruthenium or osmium,

X^1 and X^2 are identical or different ligands, preferably anionic ligands,

Z^1 and Z^2 are identical or different and neutral electron donor ligands,

R^{13} and R^{14} are identical or different and hydrogen or a substituent selected from the group consisting of alkyl, cycloalkyl, alkenyl, alkynyl, aryl, carboxylate, alkoxy, alkenyloxy, alkynyloxy, aryloxy, alkoxycarbonyl, alkylamino, dialkylamino, alkylthio, arylthio, alkylsulphonyl and alkylsulphinyl radical, each of which may optionally be substituted by one or more substituents, preferably alkyl, halogen, alkoxy, aryl or heteroaryl radicals, and

L is a ligand.

3. The process according to claim 2, wherein in the compound of the general formula (VI)

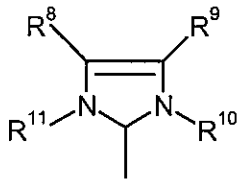
M is ruthenium,

X^1 and X^2 are both halogen, in particular, both chlorine,

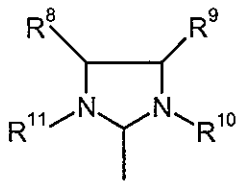
R^1 is a straight-chain or branched C_1-C_{12}-alkyl radical, preferably an isopropyl radical,

R^2, R^3, R^4, R^5 have the meanings given for the general formula (V), preferably R^2, R^3, R^4, R^5 are all hydrogen, and

L has the general and preferred meanings given for the general formula (V), preferably, L is a substituted or unsubstituted imidazolidine radical of the formula (IIa) or (IIb),



(IIa)

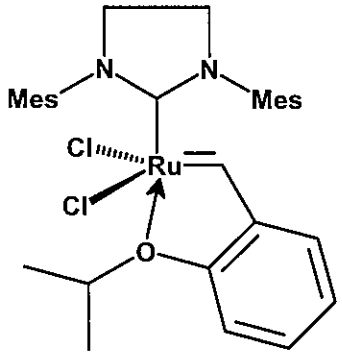


(IIb)

where

R^8, R^9, R^{10}, R^{11} are identical or different and are each hydrogen, straight-chain or branched C_1-C_{30}-alkyl, C_3-C_{20}-cycloalkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphonate, C_6-C_{24}-arylsulphonate or C_1-C_{20}-alkylsulphinyl.

4. The process according to claim 3, wherein the compound of the formula (VI) has the following formula (VII), where Mes is in each case a 2,4,6-trimethylphenyl radical;



(VII)

5. The process according to claim 2, wherein in the compound of the general formula (XVI)

M is ruthenium,

X^1 and X^2 are both halogen, in particular both chlorine,

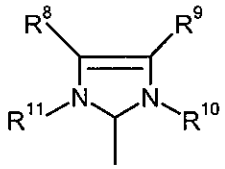
R^1 is a straight-chain or branched C_1-C_{12}-alkyl radical, preferably an isopropyl radical,

R^{12} has the meanings given for the general formula (V),

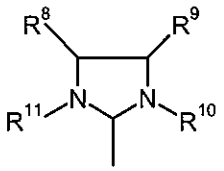
n is 0, 1, 2 or 3, preferably 0,

R^6 is hydrogen and

L has the meanings given for the general formula (V), preferably, L is a substituted or unsubstituted imidazolidine radical of the formula (IIa) or (IIb),



(IIa)

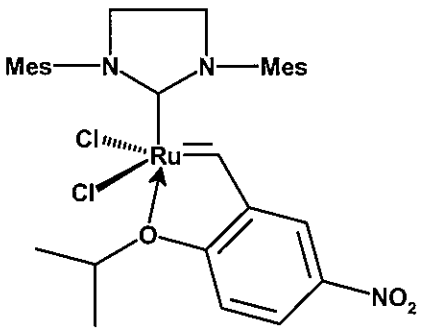


(IIb)

where

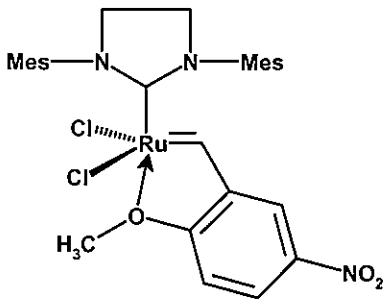
R^8, R^9, R^{10}, R^{11} are identical or different and are each hydrogen, straight-chain or branched, cyclic or acyclic C_1-C_{30}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphonate, C_6-C_{24}-arylsulphonate or C_1-C_{20}-alkylsulphinyl.

6. The process according to claim 5, wherein the compound of the general formula (XVI) has the structure (XVII)



(XVII)

7. The process according to claim 5, wherein the compound of the general formula (XVI) has the structure (XVIII), where Mes is in each case a 2,4,6-trimethylphenyl radical



(XVIII)

8. The process according to claim 2, wherein in the compound of the general formula (XXI)

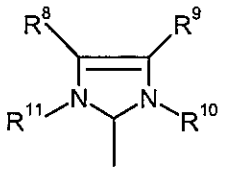
M is ruthenium,

X^1 and X^2 are both halogen, in particular, both chlorine,

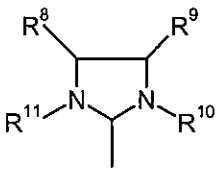
Z^1 and Z^2 are identical or different and represent five- or six-membered monocyclic groups containing 1 to 4, preferably 1 to 3, most preferably 1 or 2 heteroatoms, or bicyclic or polycyclic structures composed of 2, 3, 4 or 5 such five- or six-membered monocyclic groups wherein all aforementioned groups are optionally substituted by one or more alkyl, preferably C_1-C_{10}-alkyl, cycloalkyl, preferably C_3-C_8-cycloalkyl, alkoxy, preferably C_1-C_{10}-alkoxy, halogen, preferably chlorine or bromine, aryl, preferably C_6-C_{24}-aryl, or heteroaryl, preferably C_5-C_{23} heteroaryl radicals, or Z^1 and Z^2 together represent a bidentate ligand, thereby forming a cyclic structure,

R^{13} and R^{14} are identical or different and are each C_1-C_{30}-alkyl C_3-C_{20}-cycloalkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{30}-alkylamino, C_1-C_{30}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphinyl, each of which may optionally be substituted by one or more alkyl, halogen, alkoxy, aryl or heteroaryl radicals, and

L is a substituted or unsubstituted imidazolidine radical of the formula (IIa) or (IIb),



(IIa)

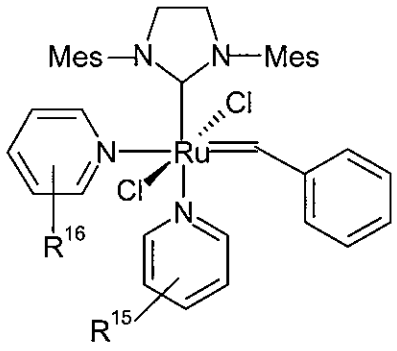


(IIb)

where

R^8, R^9, R^{10}, R^{11} are identical or different and are each hydrogen, straight-chain or branched, cyclic or acyclic C_1-C_{30}-alkyl, C_2-C_{20}-alkenyl, C_2-C_{20}-alkynyl, C_6-C_{24}-aryl, C_1-C_{20}-carboxylate, C_1-C_{20}-alkoxy, C_2-C_{20}-alkenyloxy, C_2-C_{20}-alkynyloxy, C_6-C_{24}-aryloxy, C_2-C_{20}-alkoxycarbonyl, C_1-C_{20}-alkylthio, C_6-C_{24}-arylthio, C_1-C_{20}-alkylsulphonyl, C_1-C_{20}-alkylsulphonate, C_6-C_{24}-arylsulphonate or C_1-C_{20}-alkylsulphinyl.

9. The process according to claim 8, wherein the compound of the general formula (XXI) has the formula (XXIV)

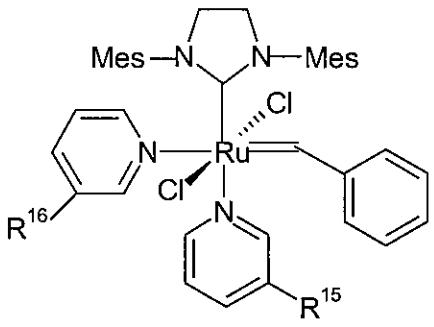


(XXIV)

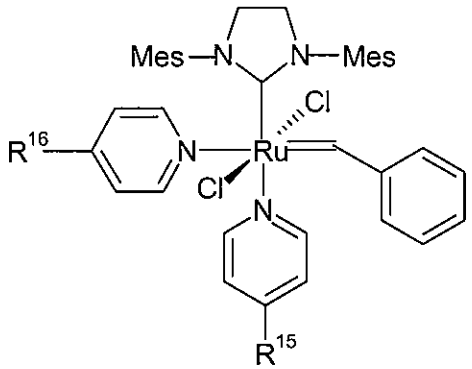
where

R^{15}, R^{16} are identical or different and represent halogen, straight-chain or branched C_1-C_{20} alkyl, C_1-C_{20} heteroalkyl, C_1-C_{10} haloalkyl, C_1–C_{10} alkoxy, C_6-C_{24} aryl, preferably phenyl, formyl, nitro, nitrogen heterocycles, preferably pyridine, piperidine and pyrazine, carboxy, alkylcarbonyl, halocarbonyl, carbamoyl, thiocarbomoyl, carbamido, thioformyl, amino, trialkylsilyl und trialkoxysilyl.

10. The process according to claim 9, wherein the compound of the general formula (XXVI) has the formula (XXIVa) or (XXIVb), wherein R^{15} and R^{16} have the same meaning as given for structural formula (XXIV)



(XXIVa)



(XXIVb)

11. The process according to any one of claims 1 to 10, wherein nitrile rubber is a copolymer of acrylonitrile and 1,3-butadiene.

12. The process according to any one of claims 2 to 11 in which the mechanical degassing device is a single-, twin- or multi-screw extruder, preferably a twin screw extruder.

13. A process for preparing a polymer composite comprising at least one optionally hydrogenated nitrile rubber having a weight average molecular weight Mw of 50,000 g/mol or less and a polydispersity index of less than 2.0, at least one cross-linking agent and/or curing system, optionally at least one filler and optionally further auxiliary products for rubbers, preferably reaction accelerators, vulcanization accelerators, vulcanization acceleration auxiliaries, antioxidants, foaming agents, anti-aging agents, heat stabilizers, light stabilizers, ozone stabilizers, processing aids, plasticizers, tackifiers, blowing agents, dyestuffs, pigments, waxes extenders, organic acids, inhibitors, metal oxides, and activators.

14. A process for preparing a shaped article comprising an optionally hydrogenated nitrile rubber having a weight average molecular weight Mw of 50,000 g/mol or less and a polydispersity index of less than 2.0, according to claim 1 or a composite according to claim 13.