Summary

[0005] The disclosure relates to hybrid compositions comprising, consisting essentially of, or consisting of at least one cyclic olefin monomer composition; at least one resin composition polymerizable by addition or condensation polymerization; and, optionally, at least one additive.

[0005a] In one aspect, the disclosure relates to a hybrid composition comprising, consisting essentially of, or consisting of:

a) at least one cyclic olefin monomer composition comprising, consisting essentially of, or consisting of:

a1) at least one cyclic olefin monomer;

a2) optionally, at least one linear monomer;

a3) at least one olefin metathesis catalyst; and

a4) optionally, at least one additive; and

b) at least one resin composition polymerizable by addition or condensation polymerization; and

c) optionally, at least one additive;

wherein components a) and/or b) are optionally crosslinked.

[0006] The disclosure also relates to articles of manufacture made from the hybrid compositions of the disclosure, and methods of making the articles.

[0006a] In another aspect, the disclosure relates to an article of manufacture, comprising, consisting essentially of, or consisting of the hybrid composition as described herein.

[0006b] In another aspect, the disclosure relates to a cured article of manufacture, comprising, consisting essentially of, or consisting of the hybrid composition as described in.

[0007] The disclosure further relates to the use of the hybrid compositions of the disclosure as coatings. And the disclosure also relates to objects or substrates coated with the hybrid compositions of the disclosure, which may then be cured for a coating. The disclosure also relates to methods of coating the objects or substrates with the hybrid compositions of the disclosure.

[0007a] The disclosure relates to a method of making a molded article, comprising, consisting essentially of, or consisting of:

forming a resin composition comprising, consisting essentially of, or consisting of the hybrid composition as described herein,

contacting the resin composition with at least one substrate, and

subjecting the resin composition to conditions effective to promote an olefin metathesis reaction of the at least one cyclic olefin monomer.

[0007b] In another aspect, the disclosure relates to a coating composition, comprising, consisting essentially of, or consisting of the hybrid composition as described herein.

[0007c] In another aspect, the disclosure relates to a method for coating at least one substrate, comprising, consisting essentially of, or consisting of:

optionally applying an adhesion promoter onto at least a portion of a surface of the at least one substrate;

applying onto the at least portion of the surface of the at least one substrate a composition comprising, consisting essentially of, or consisting of the hybrid composition as described herein; and

curing the coating applied to the substrate surface.

[0007d] In another aspect, the disclosure relates to an article of manufacture, comprising, consisting essentially of, or consisting of the at least one coated substrate as described in.

[0008] The disclosure further relates to the use of the hybrid compositions of the disclosure as adhesives.

[0008a] In another aspect, the disclosure relates to an adhesive composition, comprising, consisting essentially of, or consisting of the hybrid composition as described herein.

Detailed Description of the Invention

[0009] Terminology and Definitions

[0010] Unless otherwise indicated, the invention is not limited to specific reactants, substituents, catalysts, olefin metathesis catalysts, catalyst compositions, olefins, cyclic olefin compositions, coating compositions, reaction conditions, or the like, as such may vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only and is not to be interpreted as being limiting.

[0011] In this specification and in the claims that follow, reference will be made to a number of terms, which shall be defined to have the meanings as described herein.

[0012] The term “alkyl” as used herein, refers to a linear, branched, saturated hydrocarbon group typically containing 1 to 24 carbon atoms, preferably 1 to 12 carbon atoms, more preferably 1 to 6 carbon atoms: such as methyl (Me), ethyl (Et), n-propyl (Pr or n-Pr), iso-propyl (i-Pr), n-butyl (Bu or n-Bu), iso-butyl (i-Bu), tert-butyl (t-Bu), octyl (Oct), decyl, and the like.

[0013] The term “cycloalkyl” refers to a cyclic alkyl group, can be monocyclic, bicyclic or polycyclic, typically having 3 to 10, preferably 5 to 7, carbon atoms, generally, cycloalkyl groups are cyclopentyl (Cp), cyclohexyl (Cy), adamantyl.

[0014] The term “substituted alkyl” refers to alkyl substituted with one or more substituent groups, and the terms “heteroatom-containing alkyl” and “heteroalkyl” refer to alkyl in which at least one carbon atom is replaced with a heteroatom.

CLAIMS

The claimed invention is:

1. A hybrid composition comprising, consisting essentially of, or consisting of:

a) at least one cyclic olefin monomer composition comprising, consisting essentially of, or consisting of:

a1) at least one cyclic olefin monomer;

a2) optionally, at least one linear monomer;

a3) at least one olefin metathesis catalyst; and

a4) optionally, at least one additive; and

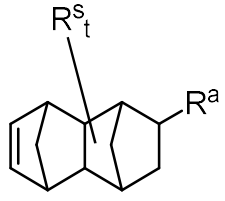
b) at least one resin composition polymerizable by addition or condensation polymerization; and

c) optionally, at least one additive;

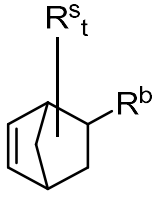
wherein components a) and/or b) are optionally crosslinked.

2. The hybrid composition of claim 1, wherein the hybrid composition comprises, consists essentially of, or consists of an interpenetrating polymer network (IPN) or a semi-interpenetrating prepolymer network (SIPN) of the at least one cyclic olefin monomer composition and the at least one resin composition polymerizable by addition or condensation polymerization.

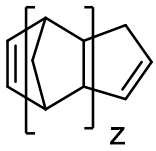
3. The hybrid composition of claim 1 or claim 2, wherein the cyclic olefin monomer is selected from the group consisting of **Formulae (I)**, **(II)**, **(III)**, **(V)**, **(VI)**, and mixtures thereof:



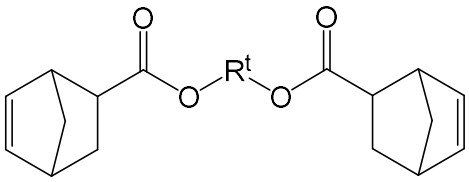
Formula (I),



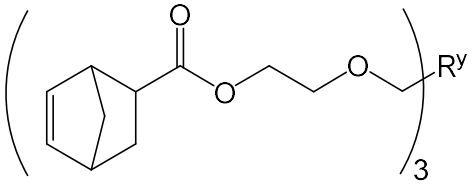
Formula (II),



Formula (III),

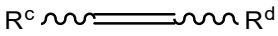


Formula (V), and



Formula (VI), and

the linear olefin monomer, if present, has the structure of **Formula (IV)**:



Formula (IV) wherein:

R^a is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted linear or branched C_{2-24} alkenyl, halogen, $-C(O)R^f$, $-CH_2-C(O)R^f$, $-OR^g$, $-CH_2-OR^g$, -CN, $-NO_2$, $-CF_3$, $-P(O)(OR^h)_2$, $-OP(O)(OR^h)_2$, $-S(O)_2OR^h$, $-OS(O)_2R^h$, optionally substituted heterocycle, $-CH_2$-(optionally substituted heterocycle), optionally substituted C_{3-10} cycloalkyl, $-CH_2$-(optionally substituted C_{3-10} cycloalkyl), optionally substituted C_{5-24} aryl, $-CH_2$-(optionally substituted C_{5-24} aryl), optionally substituted C_{3-12} cycloalkenyl, $-CH_2$-(optionally substituted C_{3-12} cycloalkenyl), $C(R^h)(R^i)COOR^j$, $-C(R^h)(R^i)C(O)H$, $-C(R^h)(R^i)C(O)R^k$, $-C(R^h)(R^i)CR^l(OR^m)(OR^n)$, $-C(R^h)(R^i)C(O)NR^oR^p$, $-C(R^h)(R^i)C(O)NR^oOR^n$, or ;

R^b is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted linear or branched C_{2-24} alkenyl, halogen, $-C(O)R^f$, $-CH_2-C(O)R^f$, $-OR^g$, $-CH_2-OR^g$, -CN, $-NO_2$, $-CF_3$, $-P(O)(OR^h)_2$, $-OP(O)(OR^h)_2$, $-Si(OR^k)_3$ $-S(O)_2OR^h$, $-OS(O)_2R^h$, optionally substituted heterocycle, spiro optionally substituted heterocycle, $-CH_2$-(optionally substituted heterocycle), optionally substituted C_{3-10} cycloalkyl, $-CH_2$-(optionally substituted C_{3-10} cycloalkyl), optionally substituted C_{5-24} aryl, $-CH_2$-(optionally substituted C_{5-24} aryl), optionally substituted C_{3-12} cycloalkenyl, $-CH_2$-(optionally substituted C_{3-12} cycloalkenyl), $C(R^h)(R^i)COOR^j$, $-C(R^h)(R^i)C(O)H$, $-C(R^h)(R^i)C(O)R^k$, $-C(R^h)(R^i)CR^l(OR^m)(OR^n)$, $-C(R^h)(R^i)C(O)NR^oR^p$, $-C(R^h)(R^i)C(O)NR^oOR^n$, or ;

R^c is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted linear or branched C_{2-24} alkenyl, halogen, $-C(O)R^f$, $-CH_2-C(O)R^f$, $-OR^g$, $-CH_2-OR^g$, CN, NO_2, $-CF_3$, $-P(O)(OR^h)_2$, $-OP(O)(OR^h)_2$, $-S(O)_2OR^h$, $-OS(O)_2R^h$, optionally substituted heterocycle, $-CH_2$-(optionally substituted heterocycle), optionally substituted C_{3-10} cycloalkyl, $-CH_2$-(optionally substituted C_{3-10} cycloalkyl), optionally substituted C_{5-24} aryl, $-CH_2$-(optionally substituted C_{5-24} aryl), optionally substituted C_{3-12} cycloalkenyl, $-CH_2$-(optionally substituted C_{3-12} cycloalkenyl), $C(R^h)(R^i)COOR^j$, $-C(R^h)(R^i)C(O)H$, $-C(R^h)(R^i)C(O)R^k$, $-C(R^h)(R^i)CR^l(OR^m)(OR^n)$, $-C(R^h)(R^i)C(O)NR^oR^p$, or $-C(R^h)(R^i)C(O)NR^oOR^n$;

R^d is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted linear or branched C_{2-24} alkenyl, halogen, $-C(O)R^f$, $-CH_2-C(O)R^f$, $-OR^g$, $-CH_2-OR^g$, CN, NO_2, $-CF_3-P(O)(OR^h)_2$, $-OP(O)(OR^h)_2$, $-S(O)_2OR^h$, $-OS(O)_2R^h$, optionally substituted heterocycle, $-CH_2$-(optionally substituted heterocycle), optionally substituted C_{3-10} cycloalkyl, $-CH_2$-(optionally substituted C_{3-10} cycloalkyl), optionally substituted C_{5-24} aryl, $-CH_2$-(optionally substituted C_{5-24} aryl), optionally substituted C_{3-12}

cycloalkenyl, -CH_2-(optionally substituted C_{3-12} cycloalkenyl), $C(R^h)(R^i)COOR^j$, -$C(R^h)(R^i)C(O)H$, -$C(R^h)(R^i)C(O)R^k$, -$C(R^h)(R^i)CR^l(OR^m)(OR^n)$, -$C(R^h)(R^i)C(O)NR^oR^p$, or -$C(R^h)(R^i)C(O)NR^oOR^n$;

each R^s is independently optionally substituted linear or branched C_{1-24} alkyl, optionally substituted linear or branched C_{2-24} alkenyl, halogen, -$C(O)R^f$, -CH_2-$C(O)R^f$, -OR^g, -CH_2-OR^g, -CN, -NO_2, -CF_3, -$P(O)(OR^h)_2$, -$OP(O)(OR^h)_2$, -$S(O)_2OR^h$, -$OS(O)_2R^h$, optionally substituted heterocycle, -CH_2-(optionally substituted heterocycle), optionally substituted C_{3-10} cycloalkyl, -CH_2-(optionally substituted C_{3-10} cycloalkyl), optionally substituted C_{5-24} aryl, -CH_2-(optionally substituted C_{5-24} aryl), optionally substituted C_{3-12} cycloalkenyl, -CH_2-(optionally substituted C_{3-12} cycloalkenyl), $C(R^h)(R^i)COOR^j$, -$C(R^h)(R^i)C(O)H$, -$C(R^h)(R^i)C(O)R^k$, -$C(R^h)(R^i)CR^l(OR^m)(OR^n)$, -$C(R^h)(R^i)C(O)NR^oR^p$, or -$C(R^h)(R^i)C(O)NR^oOR^n$;

t is 0, 1, 2, 3, 4, 5, or 6;

R^f is OH, OR^k, NR^gR^h, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^g is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, optionally substituted linear or branched C_{2-24} alkenyl, -C(O)-(optionally substituted C_{5-24} aryl), -C(O)-(optionally substituted linear or branched C_{2-24} alkenyl), or optionally substituted C_{3-12} cycloalkenyl;

R^h is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^i is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^j is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^k is optionally substituted linear or branched C_{1-24} alkyl, optionally substituted linear or branched C_{2-24} alkenyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, optionally substituted C_{3-12} cycloalkenyl, -CH_2-(optionally substituted C_{3-10} cycloalkyl), -CH_2-(optionally substituted C_{5-24} aryl), or -CH_2-(optionally substituted C_{3-12} cycloalkenyl);

R^l is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^m is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^n is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^o is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^p is H, optionally substituted linear or branched C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^t is an optionally substituted linear or branched C_1-C_{12} alkyl, -(optionally substituted linear or branched C_1-C_6 alkyl)-R^u-(optionally substituted linear or branched C_1-C_6 alkyl)-, or -(R^v)-(R^w)-(R^x)-;

R^u is O, an optionally substituted C_3-C_{10}-cycloalkyl, optionally substituted C_3-C_{12} cycloalkenyl, optionally substituted heterocycle, or optionally substituted C_5-C_{24} aryl;

R^v and R^x are independently selected from -(optionally substituted linear or branched C_1-C_{12} alkyl)-aryl-, wherein one or more of the carbon atoms in the C_1-C_{12} alkyl may be replaced by O;

R^w is optionally substituted linear or branched C_1-C_6 alkyl;

R^y is optionally substituted linear or branched C_1-C_6 alkyl; and

z is 0, 1, 2, or 3.

4. The hybrid composition of claim 3, wherein:

R^a is H, optionally substituted linear or branched C_{1-12} alkyl, optionally substituted linear or branched C_{2-6} alkenyl, halogen, -C(O)R^f, -OR^g, -CN, -NO_2, -CF_3, -P(O)(OR^h)$_2$, -OP(O)(OR^h)$_2$, -S(O)$_2$$OR^h$, -OS(O)$_2$$R^h$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^b is H, optionally substituted linear or branched C_{1-12} alkyl, optionally substituted linear or branched C_{2-6} alkenyl, halogen, -C(O)R^f, -OR^g, -CN, -NO_2, -CF_3, -P(O)(OR^h)$_2$, -OP(O)(OR^h)$_2$, -S(O)$_2$$OR^h$, -

$OS(O)_2R^h$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^c is H, optionally substituted linear or branched C_{1-12} alkyl, optionally substituted linear or branched C_{2-6} alkenyl, halogen, $-C(O)R^f$, $-OR^g$, -CN, $-NO_2$, $-CF_3$, $-P(O)(OR^h)_2$, $-OP(O)(OR^h)_2$, $-S(O)_2OR^h$, $-OS(O)_2R^h$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^d is H, optionally substituted linear or branched C_{1-12} alkyl, optionally substituted linear or branched C_{2-6} alkenyl, halogen, $-C(O)R^f$, $-OR^g$, -CN, $-NO_2$, $-CF_3$, $-P(O)(OR^h)_2$, $-OP(O)(OR^h)_2$, $-S(O)_2OR^h$, $-OS(O)_2R^h$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

t is 0;

R^f is OH, OR^k, NR^gR^h, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^g is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^h is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

z is 2;

R^i is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^j is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^k is optionally substituted C_{1-12} alkyl, optionally substituted linear or branched C_{2-12} alkenyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, optionally substituted C_{3-12} cycloalkenyl, $-CH_2$-(optionally substituted C_{3-10} cycloalkyl), $-CH_2$-(optionally substituted C_{5-24} aryl), or $-CH_2$-(optionally substituted C_{3-12} cycloalkenyl);

R^l is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^m is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^n is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl;

R^o is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl; and

R^p is H, optionally substituted C_{1-12} alkyl, optionally substituted C_{3-8} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{6-10} aryl, or optionally substituted C_{3-12} cycloalkenyl.

5. The hybrid composition of claim 3 or claim 4, wherein

the cyclic olefin monomer of **formula (I)** is tetracyclododecene (TCD), 2-ethylidene-1,2,3,4,4a,5,8,8a-octahydro-1,4:5,8-dimethanonaphthalene (ENB-DDA), 2-hexyl-1,2,3,4,4a,5,8,8a-octahydro-1,4:5,8-dimethanonaphthalene (HNB-DDA), or a mixture thereof;

the cyclic olefin monomer of **formula (II)** is 5-ethylidene-2-norbornene (ENB), 5-octyl-2-norbornene (ONB), 2-hydroxyethyl bicyclo[2.2.1]hept-5-ene-2-carboxylate (HENB), 5-carboxylic acid-2-norbornene methyl ester (NBMeE), 5-carboxylic acid-2-norbornene ethyl ester (NBEtE), 5-carboxylic acid-2-norbornene n-Butyl ester (NBnBE), 5-carboxylic acid-2-norbornene tert-butyl ester (NBtBE), 5-carboxylic acid-2-norbornene 2-ethyl hexyl ester (NB-EHE), 5-norbornene-2,3-dicarboxylic acid, dimethyl ester, bicyclo[2.2.1]hept-5-ene-2-carboxylic acid, (3a*R*,4*R*,7*R*,7a*R*)-3a,4,5,6,7,7a-hexahydro-4,7-methano-1*H*-inden-5-yl ester (NB-DCPE), carbamic acid, [3-(triethoxysilyl)propyl]-bicyclo[2.2.1]hept-5-en-2-ylmethyl ester (NBCbSi), 5-norbornene-2-methanol (NB-methanol), 5-norbornene-2-exo,3-exo-dimethanol (NB-dimethanol), 2-hydroxyethyl bicyclo[2.2.1]hept-5-ene-2-carboxylate (NB-epoxide), norbornene triethoxy silane (NB-triethoxysilane), 5-(perfluorobutyl)bicyclo[2.2.1]hept-2-ene (NB-Fluorocarbon (1)), bicyclo[2.2.1]hept-5-ene-2-carboxylic acid, 1,1,2,2,3,3,4,4,5,5,6,6-dodecafluorohexyl ester (NB-fluorocarbon (2)), bicyclo[2.2.1]hept-5-ene-2-carboxylic acid, 2,2,2-trifluoro-1-(trifluoromethyl)ethyl ester (NB-fluorocarbon (3)), or a mixture thereof; and

the cyclic olefin monomer of **formula (III)** is dicyclopentadiene (DCPD), tricyclopentadiene (TCPD), tetracyclopentadene (TeCPD), or a mixture thereof.

6. The hybrid composition of any one of claims 3-5, wherein:

the cyclic olefin monomer of **formula (II)** is 5-ethylidene-2-norbornene (ENB), 5-octyl-2-norbornene (ONB), or a mixture thereof; and

the cyclic olefin monomer of **formula (III)** is dicyclopentadiene (DCPD), tricyclopentadiene (TCPD), tetracyclopentadene (TeCPD), or a mixture thereof.

7. The hybrid composition of any one of claims 3-6, wherein the cyclic olefin monomer of **formula (III)** is dicyclopentadiene (DCPD) and tricyclopentadiene (TCPD) and the ratio of DCPD:TCPD ranges from 30:70 to 70:30 (e.g., 35:65, 40:60, 43:57, 45:55, 50:50, 55:45, 57:43, 60:40, 65:35).

8. The hybrid composition of any one of claims 1-7, wherein the additive (a3) and (d) are independently selected from the group consisting of an adhesion promoter, a free radical initiator, a cationic initiator, a gel modifier, a hardness modulator, an impact modifier, a cure rate inhibitor, a pot-life controller, an antioxidant, an antiozonant, a filler, a binder, a thixotrope, a rheology modifier, a dispersant, a wetting agent, a plasticizer, a pigment, a flame retardant, a dye, fibers, a reinforcement material, a coupling agent, a UV absorber, a UV light stabilizer, a film former, a lubricant, and mixtures thereof.

9. The hybrid composition of claim 8, wherein the additive is an antioxidant selected from Irganox 1076.

10. The hybrid composition of claim 8 or claim 9, wherein the additive is a pot life extender.

11. The hybrid composition of any one of claims 8-10, wherein the additive is an adhesion promoter selected from a silane coupling agent (e.g., Silquest A-151, Bicyclo[2.2.1]hept-5-en-2-yl)triethoxysilane).

12. The hybrid composition of any one of claims 8-11, wherein the additive is a rheology modifier selected from CAB-O-SIL® TS-720.

13. The hybrid composition of any one of claims 8-12, wherein the additive is a filler selected from Mica C-3000.

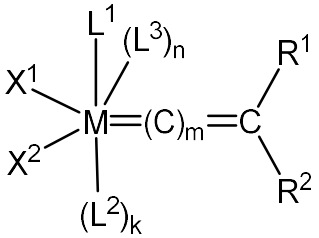
14. The hybrid composition of any one of claims 1-13, wherein the resin composition polymerizable by addition or condensation polymerization is selected from the group consisting of a polyurethane formulation, an epoxy resin formulation, an inorganic silicone-ceramic formulation, a silicone acrylic matrix formulation, and mixtures thereof.

15. The hybrid composition of claim 14, wherein the polyurethane formulation comprises the reaction product of at least one polyol and at least one polyisocyanate.

16. The hybrid composition of claim 15, wherein the polyol is 1,5-pentadiol or 1,5-propanediol, and the polyisocyanate is an HDI trimer.

17. The hybrid composition of any one of claims 1-16, wherein the ratio of the cyclic olefin monomer prepolymer network : the SIPN ranges from 75:25 to 25:75 (e.g., 70:30, 60:40, 50:50, 40:60, 30:70).

18. The hybrid composition of any one of claims 1-17, wherein the at least one olefin metathesis catalyst has the structure of **Formula (1)**:



Formula (1),

wherein:

M is ruthenium;

L^1, L^2, and L^3 are independently neutral electron donor ligands;

n is 0 or 1;

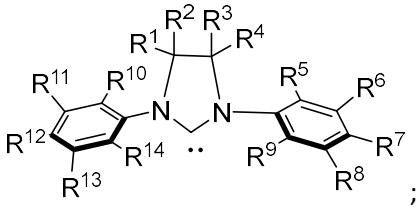
m is 0, 1, or 2;

k is 0 or 1;

X^1 and X^2 are independently anionic ligands; and

R^1 and R^2 are independently hydrogen, optionally substituted hydrocarbyl, optionally substituted heteroatom-containing hydrocarbyl; or R^1 and R^2 are linked together to form one or more cyclic groups.

19. The hybrid composition of claim 18, wherein:

L^1 and/or L^2 is  ;

R^1 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^2 can form a spiro compound, or together with R^3 or together with R^4 can form a polycyclic ring;

R^2 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^1 can form a spiro compound, or together with R^3 or together with R^4 can form a polycyclic ring;

R^3 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^2 or together with R^1 can form a polycyclic ring, or together with R^4 can form a spiro compound;

R^4 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^3 can form a spiro compound, or together with R^2 or together with R^1 can form a polycyclic ring;

R^5 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^6 can form an optionally substituted polycyclic ring;

R^6 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^5 or together with R^7 can form an optionally substituted polycyclic ring;

R^7 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl optionally substituted C_{3-8} cycloalkenyl, or together with R^6 or together with R^8 can form an optionally substituted polycyclic ring;

R^8 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^7 or together with R^9 can form an optionally substituted polycyclic ring;

R^9 is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^8 can form an optionally substituted polycyclic ring;

R^{10} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^{11} can form an optionally substituted polycyclic ring;

R^{11} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^{10} or together with R^{12} can form an optionally substituted polycyclic ring;

R^{12} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^{11} or together with R^{13} can form an optionally substituted polycyclic ring;

R^{13} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^{14} or together with R^{12} can form an optionally substituted polycyclic ring;

R^{14} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, -CN, $-NR^{27}R^{28}$, $-NO_2$, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or together with R^{13} can form a polycyclic ring;

R^{25} is -OH, $-OR^{30}$, $-NR^{27}R^{28}$, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-8} cycloalkenyl;

R^{26} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-8} cycloalkenyl;

R^{27} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-8} cycloalkenyl;

R^{28} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-8} cycloalkenyl;

R^{29} is H, optionally substituted C_{1-24} alkyl, $-OR^{26}$, $-NR^{27}R^{28}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-8} cycloalkenyl;

R^{30} is optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl, or optionally substituted C_{3-8} cycloalkenyl;

R^{31} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl; and

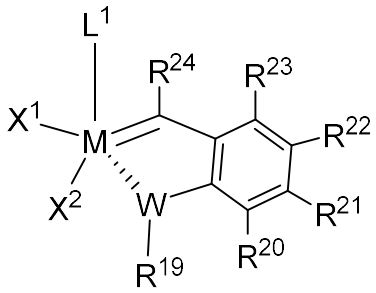
x is 1 or 2.

20. The hybrid composition of claim 18 or claim 19, wherein L^1 and/or L^2 is $PR^{H1}R^{H2}R^{H3}$ wherein: R^{H1}, R^{H2}, and R^{H3} are each independently optionally substituted C_6-C_{10} aryl, optionally substituted C_1-C_{10} alkyl, or optionally substituted C_3-C_{10} cycloalkyl.

21. The hybrid composition of any one of claims 17-20, wherein: R^1 is hydrogen and R^2 is phenyl; or R^1 is hydrogen and R^2 is 3-methyl-1-propenyl; or R^1 and R^2 are linked together to form 3-phenylindenylid-1-ene.

22. The hybrid composition of claim 20, wherein: R^{H1} is phenyl, ethyl, or cyclohexyl, R^{H2} is phenyl or cyclohexyl, and R^{H3} is phenyl, ethyl, or cyclohexyl.

23. The hybrid composition of any one of claims 1-17, wherein the at least one olefin metathesis catalyst has the structure of **Formula (2)**:



Formula (2)

wherein:

M is ruthenium;

L^1 is a neutral electron donor ligand;

X^1 and X^2 are independently anionic ligands;

W is O, halogen, NR^{33} or S;

R^{19} is H, optionally substituted C_{1-24} alkyl, $-C(R^{34})(R^{35})COOR^{36}$, $-C(R^{34})(R^{35})C(O)H$, $-C(R^{34})(R^{35})C(O)R^{37}$, $-C(R^{34})(R^{35})CR^{38}(OR^{39})(OR^{40})$, $-C(R^{34})(R^{35})C(O)NR^{41}R^{42}$, $-C(R^{34})(R^{35})C(O)NR^{41}OR^{40}$, $-C(O)R^{25}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl, or when W is NR^{33}, then R^{19} together with R^{33} can form an optionally substituted heterocyclic ring or when W is halogen then R^{19} is nil;

R^{20} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^{21} can form a polycyclic ring;

R^{21} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^{20} or together with R^{22} can form a polycyclic ring;

R^{22} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^{21} or together with R^{23} can form a polycyclic ring;

R^{23} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^{22} can

form a polycyclic ring;

R^{24} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{25} is OH, OR^{30}, $NR^{27}R^{28}$, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{26} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{27} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{28} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{29} is H, optionally substituted C_{1-24} alkyl, OR^{26}, $-NR^{27}R^{28}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{30} is optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{31} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{33} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{34} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{35} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{36} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{37} is optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{38} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{39} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{40} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{41} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl;

R^{42} is H, optionally substituted C_{1-24} alkyl, optionally substituted C_{3-10} cycloalkyl, optionally substituted heterocycle, optionally substituted C_{5-24} aryl or optionally substituted C_{3-8} cycloalkenyl; and

x is 1 or 2.

24. The hybrid composition of claim 23, wherein:

M is ruthenium;

L^1 is a neutral electron donor ligand;

X^1 and X^2 are independently anionic ligands;

W is O;

R^{19} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{20} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{21} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^{20} or together with R^{22} can form a polycyclic ring;

R^{22} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl.;

R^{23} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{24} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{25} is OH, OR^{30}, $NR^{27}R^{28}$, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{26} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{27} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{28} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

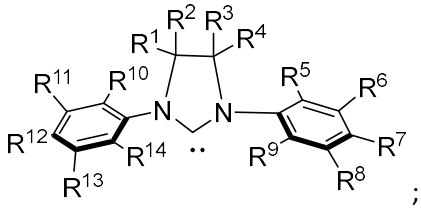
R^{29} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, OR^{26}, $-NR^{27}R^{28}$, cyclohexyl, cyclopentyl or phenyl;

R^{30} is methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{31} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

x is 1 or 2.

25. The hybrid composition of claim 23 or claim 24, wherein:

L^1 is ;

R^1 is H, phenyl, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, or sec-butyl;

R^2 is H, phenyl, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, or sec-butyl;

R^3 is H, phenyl, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, or sec-butyl;

R^4 is H, phenyl, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, or sec-butyl;

R^5 is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, F, optionally substituted phenyl, or together with R^6 can form an optionally substituted polycyclic ring;

R^6 is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, F, optionally substituted phenyl, or together with R^5 or together with R^7 can form an optionally substituted polycyclic ring;

R^7 is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, optionally substituted phenyl, or together with R^6 or together with R^8 can form an optionally substituted polycyclic ring;

R^8 is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, optionally substituted phenyl, or together with R^7 or together with R^9 can form an optionally substituted polycyclic ring;

R^9 is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, F, optionally substituted phenyl, or together with R^8 can form a polycyclic ring;

R^{10} is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, optionally substituted phenyl, or together with R^{11} can form an optionally substituted polycyclic ring;

R^{11} is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, optionally substituted phenyl, or together with R^{10} or together with R^2 can form an optionally substituted polycyclic ring;

R^{12} is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, F, optionally substituted phenyl, or together with R^{11} or together with R^{13} can form a polycyclic ring;

R^{13} is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, F, optionally substituted phenyl, or together with R^{12} or together with R^{14} can form an optionally substituted polycyclic ring;

R^{14} is H, methyl, ethyl, iso-propyl, n-propyl, n-butyl, tert-butyl, sec-butyl, optionally substituted phenyl, or together with R^{13} can form an optionally substituted polycyclic ring.

R^{19} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{20} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{21} is H, optionally substituted C_{1-24} alkyl, halogen, $-C(O)R^{25}$, $-OR^{26}$, CN, $-NR^{27}R^{28}$, NO_2, $-CF_3$, $-S(O)_xR^{29}$, $-P(O)(OH)_2$, $-OP(O)(OH)_2$, $-SR^{31}$, optionally substituted heterocycle, optionally substituted C_{3-10} cycloalkyl, optionally substituted C_{5-24} aryl, optionally substituted C_{3-8} cycloalkenyl or together with R^{20} or together with R^{22} can form a polycyclic ring;

R^{22} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl.;

R^{23} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{24} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{25} is OH, OR^{30}, $NR^{27}R^{28}$, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{26} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{27} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{28} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

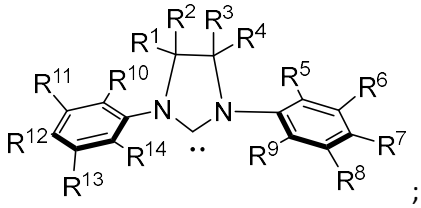
R^{29} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, OR^{26}, $-NR^{27}R^{28}$, cyclohexyl, cyclopentyl or phenyl;

R^{30} is methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

R^{31} is H, methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *tert*-butyl, cyclohexyl, cyclopentyl or phenyl;

x is 1 or 2.

26. The hybrid composition of any one of claims 23-25, wherein:

L^1 is ;

R^1 is H;

R^2 is H;

R^3 is H;

R^4 is H;

R^5 is H, methyl, or iso-propyl;

R^6 is H;

R^7 is H, methyl;

R^8 is H;

R^9 is H, methyl, or iso-propyl;

R^{10} is H, methyl, or iso-propyl;

R^{11} is H;

R^{12} is H or methyl;

R^{13} is H;

R^{14} is H, methyl, or iso-propyl;

X^1 and X^2 are Cl;

W is O;

R^{19} is iso-propyl;

R^{20} is H;

R^{21} is H;

R^{22} is H;

R^{23} is H; and

R^{24} is H.

27. An article of manufacture, comprising, consisting essentially of, or consisting of the hybrid composition of any one of claims 1-26.

28. A method of making a molded article, comprising, consisting essentially of, or consisting of:

forming a resin composition comprising, consisting essentially of, or consisting of the hybrid composition of any one of claims 1-26,

contacting the resin composition with at least one substrate, and

subjecting the resin composition to conditions effective to promote an olefin metathesis reaction of the at least one cyclic olefin monomer.

29. A coating composition, comprising, consisting essentially of, or consisting of the hybrid composition of any one of claims 1-26.

30. A method for coating at least one substrate, comprising, consisting essentially of, or consisting of:

optionally applying an adhesion promoter onto at least a portion of a surface of the at least one substrate;

applying onto the at least portion of the surface of the at least one substrate a composition comprising, consisting essentially of, or consisting of the hybrid composition of any one of claims 1-26; and

curing the coating applied to the substrate surface.

31. An article of manufacture, comprising, consisting essentially of, or consisting of the at least one coated substrate of claim 30.

32. The article of manufacture of claim 31, wherein the substrate is a metal surface.

33. The article of manufacture of claim 32, wherein the substrate is a nonmetal surface.

34. An adhesive composition, comprising, consisting essentially of, or consisting of the hybrid composition of any one of claims 1-26.

35. A cured article of manufacture, comprising, consisting essentially of, or consisting of the hybrid composition of any one of claims 1-26.