CLAIMS:

1. A lubricating composition, comprising a first base oil component consisting of a polyalphaolefin base stock or combination of polyalphaolefin base stocks, each having a kinematic viscosity at 100°C of from 3.2 cSt to 3.8 cSt and a Noack volatility of less than or equal to 12.5 wt% and obtained by a process comprising:

a. contacting a catalyst, an activator, and a monomer in a first reactor to obtain a first reactor effluent, the effluent comprising a dimer product, a trimer product, and optionally a higher oligomer product,

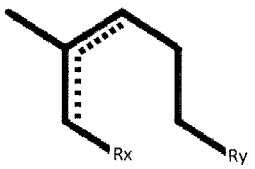
b. feeding at least a portion of the dimer product to a second reactor,

c. contacting said dimer product with a second catalyst, a second activator, and optionally a second monomer in the second reactor,

d. obtaining a second reactor effluent, the effluent comprising at least a trimer product, and

e. hydrogenating at least the trimer product of the second reactor effluent,

wherein the dimer product of the first reactor effluent contains at least 25 wt% of tri-substituted vinylene represented by the following structure:



and the dashed line represents the two possible locations where the unsaturated double bond may be located and Rx and Ry are independently selected from a C_3 to C_{21} alkyl group.

2. The lubricating composition of claim 1,

wherein the first base oil component is present in an amount of from 5 wt% to 60 wt%, based on the total weight of the composition;

the compostion further comprises 20 wt% to 70 wt% of a second base oil component, based on the total weight of the composition, the second base oil component consisting of a Group III base stock or any combination of Group III base stocks; and

wherein the composition has a kinematic viscosity at 100°C of from 5.6 to 16.3 cSt, a Noack volatility of less than 15% as determined by ASTM D5800, a CCS viscosity of less than 6200 cP at -35°C as determined by ASTM D5293, and an HTHS viscosity of from 2.5 mPa-s to 4.0 mPa-s at 150°C as determined by ASTM D4683.

3. The lubricating composition of claim 1 ~~or 2~~, wherein the first reactor effluent contains less than 70 wt% of di-substituted vinylidene represented by the following formula:

$$RqRzC{=}CH_2$$

wherein Rq and Rz are independently selected from alkyl groups.

4. The lubricating composition of ~~claims~~ claim 1 ~~to 3~~, wherein the dimer product of the first reactor effluent contains greater than 50 wt% of tri-substituted vinylene dimer.

5. The lubricating composition of ~~claims~~ claim 1 ~~to 4~~, wherein the second reactor effluent has a product having a carbon count of C_{28}-C_{32}, wherein said product comprises at least 70 wt% of said second reactor effluent.

6. The lubricating composition of ~~claims~~ claim 1 ~~to 5~~, wherein the monomer contacted in the first reactor is comprised of at least one linear alpha olefin wherein the linear alpha olefin is selected from at least one of 1-hexene, 1-octene, 1-nonene, 1-decene, 1-dodecene, 1-tetradecene, and combinations thereof.

7. The lubricating composition of ~~claims~~ claim 1 ~~to 6~~, wherein monomer is fed into the second reactor, and the monomer is a linear alpha olefin selected from the group including 1-hexene, 1-octene, 1-nonene, 1-decene, 1-dodecene, and 1-tetradecene.

8. The lubricating composition of ~~claims~~ claim 1 ~~to 7~~, wherein said catalyst in said first reactor is represented by the following formula:

$$X_1X_2M_1(CpCp^*)M_2X_3X_4$$

wherein:

M_1 is an optional bridging element;

M_2 is a Group 4 metal;

Cp and Cp* are the same or different substituted or unsubstituted cyclopentadienyl ligand systems, or are the same or different substituted or unsubstituted indenyl or tetrahydroindenyl rings, wherein, if substituted, the substitutions may be independent or linked to form multicyclic structures;

X_1 and X_2 are independently hydrogen, hydride radicals, hydrocarbyl radicals, substituted hydrocarbyl radicals, silylcarbyl radicals, substituted silylcarbyl radicals, germylcarbyl radicals, or substituted germylcarbyl radicals; and

X_3 and X_4 are independently hydrogen, halogen, hydride radicals, hydrocarbyl radicals, substituted hydrocarbyl radicals, halocarbyl radicals, substituted halocarbyl radicals, silylcarbyl radicals, substituted silylcarbyl radicals, germylcarbyl radicals, or substituted germylcarbyl radicals; or both X_3 and X_4 are joined and bound to the metal atom to form a metallacycle ring containing from about 3 to about 20 carbon atoms.

9. The lubricating composition of ~~claims~~ claim 1 ~~to 8~~, wherein the first step of contacting occurs by contacting the catalyst, activator system, and monomer wherein the catalyst is represented by the formula of

$$X_1X_2M_1(CpCp^*)M_2X_3X_4$$

wherein:

M_1 is a bridging element of silicon,

M_2 is the metal center of the catalyst, and is preferably titanium, zirconium, or hafnium,

Cp and Cp* are the same or different substituted or unsubstituted indenyl or tetrahydroindenyl rings that are each bonded to both M_1 and M_2, and

X_1, X_2, X_3, and X_4 or are preferably independently selected from hydrogen, branched or unbranched C_1 to C_{20} hydrocarbyl radicals, or branched or unbranched substituted C_1 to C_{20} hydrocarbyl radicals; and

the activator system is a combination of an activator and co-activator, wherein the activator is a non-coordinating anion, and the co-activator is a tri-alkylaluminum compound wherein the alkyl groups are independently selected from C_1 to C_{20} alkyl groups, wherein the molar ratio of activator to transition metal compound is in the

range of 0.1 to 10 and the molar ratio of co-activator to transition metal compound is 1 to 1000, and

the catalyst, activator, co-activator, and monomer are contacted in the absence of hydrogen, at a temperature of 80°C to 150°C, and with a reactor residence time of 2 minutes to 6 hours.

10. The lubricating composition of ~~claims~~ claim 1 ~~to 9~~, wherein the polyalphaolefin base stock comprises decene trimer molecules.

11. The lubricating composition of ~~claims~~ claim 2 ~~to 10~~, wherein the Group III base stock or base stocks each have a kinematic viscosity at 100°C of between 4 cSt and 9 cSt.

12. The lubricating composition of ~~claims~~ claim 2 ~~to 11~~, further comprising 1 wt% to 20 wt% of a third base oil component, based on the total weight of the composition, the third base oil component consisting of a Group V base stock or any combination of Group V base stocks.

13. The lubricating composition of claim 12, wherein the third base oil component comprises an alkylated naphthalene base stock.

14. The lubricating composition of claim 12, wherein the third base stock component comprises an ester base stock.

15. The lubricating composition of claim 2 ~~to 14~~, wherein the composition is a 0W-20, 0W-30 or 0W-40 SAE viscosity grade engine oil.

16. The lubricating composition of ~~claims~~ claim 2 ~~to 15~~, wherein the composition has a kinematic viscosity at 100°C of less than 9.3 cSt.

17. The lubricating composition of ~~claims~~ claim 2 ~~to 16~~, wherein the composition has a CCS viscosity of less than 5000 cP at -35°C as determined by ASTM D5293.

18. The lubricating composition of ~~claims~~ claim 2 ~~to 18~~, further comprising 2 wt% to 25 wt% of a conventional PAO chosen from the group consisting of PAO 4, PAO 5, PAO 6 and PAO 8.

19. The lubricating composition of ~~claims~~ claim 2 ~~to 19~~, wherein the composition is an engine oil composition.