CLAIMS

1. A method of producing ultra high molecular weight (UHMW) C_4-C_{30} α-olefin drag reducing agent (DRA) comprising:

polymerizing in a reactor a first α-olefin monomer in the presence of a catalyst and a hydrocarbon solvent to produce the UHMW C_4-C_{30} α-olefin polymer DRA, where the catalyst consists essentially of:

at least one tertiary monophenyl amine selected from the group consisting of N,N-diethylaniline, N-ethyl-N-methylparatolylamine, N,N-dipropylaniline, N,N-diethylmesitylamine, and combinations thereof;

at least one titanium halide having a formula TiX_m, where m is from 2.5 to 4.0 and X is a halogen containing moiety; and

at least one cocatalyst having a formula AlR_nY_{3-n} where R is a hydrocarbon radical, Y is a halogen or hydrogen, and n is 1-3,

where the catalyst is absent of a carrier or support.

2. The method of claim 1 where the UHMW C_4-C_{30} α-olefin polymer DRA is a homopolymer, copolymer, or a terpolymer.

3. The method of claim 1 where the polymerizing step involves copolymerizing the first α-olefin monomer with a second α-olefin comonomer, where the first and second α-olefin comonomers are different C_4-C_{30} olefins.

4. The method of claim 3 where the first α-olefin comonomer and the second α-olefin comonomer comprise C_6-C_{12} olefins.

5. The method of claim 4 where the first α-olefin comonomer is 1-hexene and the second α-olefin comonomer is 1-dodecene.

6. The method of claim 1 where the UHMW C_4-C_{30} α-olefin polymer DRA has a non-crystalline structure.

7. The method of claim 1 further comprising activating the titanium halide and the cocatalyst prior to adding to the reactor for the polymerizing step.

8. The method of claim 7 further comprising adding the tertiary monophenyl amine to the reactor prior to the addition of activated titanium halide and cocatalyst to the reactor.

9. The method of claim 1 further comprising activating the titanium halide, the cocatalyst, and the tertiary monophenyl amine prior to adding to the reactor for the polymerizing step.

10. The method of claim 1 where the hydrocarbon solvent is added prior to the polymerizing step, throughout the polymerizing step, or at the inception of a rod climbing effect.

11. The method of claim 10 where the hydrocarbon solvent is added at the inception of the rod climbing effect.

12. The method of claim 1 where the titanium halide is reduced with metallic Al.

13. The method of claim 1 where the titanium halide is $TiCl_3 \cdot 1/3AlCl_3$.

14. The method of claim 1 where the cocatalyst comprises one or more organoaluminum compounds selected from the group consisting of trimethyl aluminum, triethyl aluminum, tri-n-propyl aluminum, tri-n-butyl aluminum, tri-isobutyl aluminum, tri-n-hexyl aluminum, tri(2-methylpentyl) aluminum, tri-n-octyl aluminum, diethyl aluminum hydride, diisobutyl aluminum hydride, diisopropyl aluminum chloride, dimethyl aluminum chloride, diethyl aluminum chloride, diethyl aluminum bromide, diethyl aluminum iodide, di-n-propyl aluminum chloride, di-n-butyl aluminum chloride, and diisobutyl aluminum chloride.

15. The method of claim 1 where the tertiary monophenyl amine comprises N,N-diethylaniline.

16. The method of claim 1 where the polymerizing step occurs at and less than room temperature.

17. The method of claim 1 where the hydrocarbon solvent comprises one or more solvents selected from the group consisting of straight chain aliphatic compounds, branched hydrocarbons, alicyclic hydrocarbons, and aromatic hydrocarbons.

18. The method of claim 17 where the hydrocarbon solvent comprises one or more aromatic solvents.

19. The method of claim 1 where the polymerizing step occurs in an argon atmosphere for a duration of 4 to 6 hours with a reaction temperature of 15 to 25°C and a stirrer speed of 600 to 800 rpm.

20. The method of claim 1 where the UHMW C_4-C_{30} α-olefin polymer DRA has a molecular weight distribution (MWD) of at least 3.25, where MWD is defined as M_w/M_n with M_w being a weight average molecular weight and M_n being a number average molecular weight.

21. The method of claim 1 where the UHMW C_4-C_{30} α-olefin polymer DRA has a weight average molecular weight (M_w) of at least 1.5×10^6 g/mol.