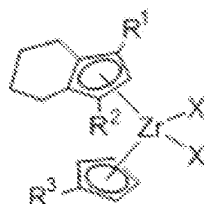


Claims

What is claimed:

1. A polymerization catalyst having improved selectivity for ethylene enchainment, the polymerization catalyst comprising a zirconocene catalyst of Formula I:



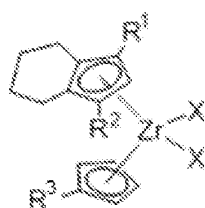
(Formula I)

wherein R_1 is a C_1 to C_{20} alkyl, aryl or aralkyl group, wherein R_2 is an C_1 to C_{20} alkyl, aryl or aralkyl group, and wherein R_3 is a C_1 to C_{20} alkyl or a hydrogen, and wherein each X is independently a halide, C_1 to C_{20} alkyl, aralkyl group or hydrogen.

2. The polymerization catalyst of claim 1, wherein R_2 is a C_1 alkyl.
3. The polymerization catalyst of claim 2, wherein R_1 is a C_1 alkyl.
4. The polymerization catalyst of claim 3, wherein R_3 is a linear C_3 alkyl.
5. The polymerization catalyst of claim 3, wherein R_3 is an C_1 alkyl.
6. The polymerization catalyst of claim 2, wherein R_3 is a hydrogen.
7. The polymerization catalyst of claim 6, wherein R_1 is an C_1 alkyl.
8. The polymerization catalyst of claim 6, wherein R_1 is a C_3 alkyl.
9. The polymerization catalyst of claim 1, wherein the polymerization catalyst of Formula I is included in a bimodal polymerization catalyst system further including a non-metallocene olefin polymerization catalyst.

10. A bimodal polyethylene composition having improved ethylene enchainment comprising a high molecular weight polyethylene component and a low molecular weight polyethylene component formed together in a single reactor via a bimodal polymerization catalyst system comprising:

- a non-metallocene olefin polymerization catalyst; and
- a zirconocene catalyst of the Formula I:



(Formula I)

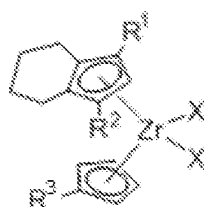
wherein R_1 is a C_1 to C_{20} alkyl, aryl or aralkyl group, wherein R_2 is an C_1 to C_{20} alkyl, aryl or aralkyl group, and wherein R_3 is a C_1 to C_{20} alkyl or a hydrogen, and wherein each X is independently a halide, C_1 to C_{20} alkyl, aralkyl group or hydrogen.

11. The bimodal polyethylene composition of claim 10, wherein the low molecular weight polyethylene has a butyl branching frequency of from 0.43 to 0.72.

12. A method of producing a bimodal polyethylene having improved ethylene enchainment, the method comprising:

polymerizing ethylene in a reactor in presence of a bimodal polymerization catalyst system to form the bimodal polyethylene, wherein the bimodal polymerization catalyst comprises:

- a non-metallocene catalyst; and
- a zirconocene catalyst of Formula I:



(Formula I)

wherein R_1 is a C_1 to C_{20} alkyl, aryl or aralkyl group, wherein R_2 is an C_1 to C_{20} alkyl, aryl or aralkyl group, and wherein R_3 is a C_1 to C_{20} alkyl or a hydrogen, and wherein each X is independently a halide, C_1 to C_{20} alkyl, aralkyl or hydrogen.