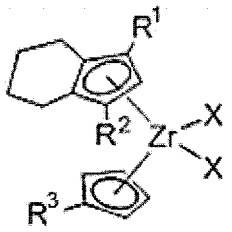
Claims

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.

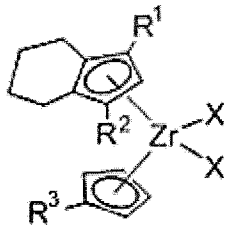
6. The polymerization catalyst of claim 2, wherein R_3 is a hydrogen and R_1 is an C_1 alkyl or an C_3 alkyl.

7. 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.

8. 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.

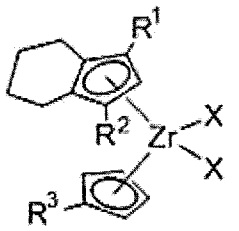
9. The bimodal polyethylene composition of claim 8, wherein the low molecular weight polyethylene has a butyl branching frequency of from 0.43 to 0.72.

10. 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)