Claims:

1. A copolymer of ethylene and an α-olefin said copolymer having

(a) a density D in the range 0.900 - 0.940 g/cm^3,

(b) a melt index MI_2 (2.16 kg, 190°C) in the range of 0.01 - 50 g/10 min,

(c) a melt index MI_2 (2.16 kg, 190°C) and Dow Rheology Index (DRI) satisfying the equation

$[DRI/MI_2] > 2.65$, and

(d) a Dart Drop Impact (DDI) in g of a blown film having a thickness of 25 μm produced from the copolymer satisfying the equation

$DDI \geq 19000 \times \{1 - Exp[-750(D - 0.908)^2]\} \times \{Exp[(0.919 - D)/0.0045]\}$.

2. A copolymer of ethylene and an α-olefin said copolymer having

(a) a density (D) in the range 0.900 - 0.940 g/cm^3,

(b) a melt index MI_2 (2.16 kg, 190°C) in the range of 0.01 - 50 g/10 min,

(c) a melt elastic modulus G' (G'' =500 Pa) in the range 80 - 120 Pa, and

(d) a melt index MI_2 (2.16 kg, 190°C) and Dow Rheology Index (DRI) satisfying the equation

$[DRI/ MI_2] \geq 5$.

3. The~~A~~ copolymer according to ~~either of the preceding~~ claims 1 having a density (D) in the range 0.910 - 0.935 g/cm^3 ~~and most preferably in the range 0.915 – 0.933 g/cm^3~~.

4. The~~A~~ copolymer according to ~~any of the preceding~~ claims 1 having a melt index MI_2 (2.16 kg, 190°C) in the range of 0.3 - 50 g/10 min ~~and most preferably in the range 0.3 – 5 g/10min~~.

5. The~~A~~ copolymer according to ~~any of preceding~~ claims 1 having a Dow Rheology Index (DRI) in the range 1 - 15.

6. The~~A~~ copolymer according to ~~any of the preceding~~ claims 1 having a molecular weight distribution in the range 4.0 - 20 ~~and most preferably in the range 4.5 – 12.0~~.

7. The~~A~~ copolymer according to ~~any of the preceding~~ claims 1 having a comonomer partitioning factor $C_{pf} \geq 1.0$.

8. The~~A~~ copolymer according to ~~any of the preceding~~ claims 1 having a Dart Drop Impact (DDI) ≥ 1000 g of a blown film having a thickness of 25 μm produced from said copolymer having a density (D) in the range of 0.9118 - 0.9248.

9. The~~A~~ copolymer according to ~~any of the preceding~~ claims 1 wherein the α-olefin has C4 - C12 carbon atoms.

10. The~~A~~ copolymer according to claim 9 wherein the α-olefin is 1-hexene.

11. The copolymer according to claim 3 having a density (D) in the range 0.915-0.933 g/cm^3.

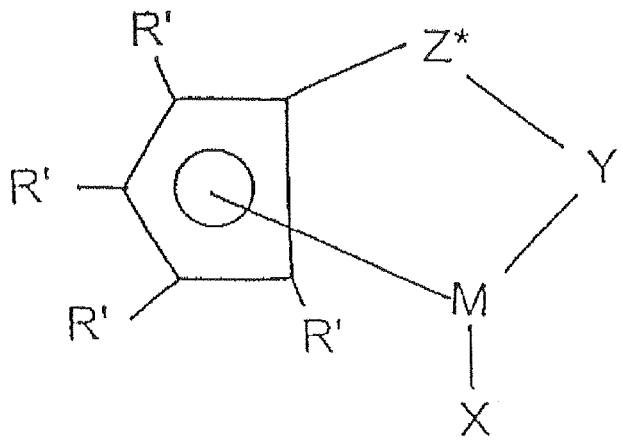
12. The copolymer according to claim 4 having a melt index MI_2 (2.16 kg, 190°C) in the range of 0.3-5 g/10 min.

13. The copolymer according to claim 6 having a molecular weight distribution in the range 4.5-12.0.

14~~11~~. A process for the preparation of copolymers according to ~~any of the preceding~~ claim~~s~~ 1 said process comprising polymerizing ethylene and an α-olefin in the presence of a metallocene catalyst system.

15~~12~~. The~~A~~ process according to claim 14~~11~~ wherein the metallocene catalyst system comprises a monocyclopentadienyl metallocene complex.

16~~13~~. The~~A~~ process according to claim 15~~12~~ wherein the monocyclopentadienyl metallocene complex has the general formula:



wherein:-

R' each occurrence is independently selected from hydrogen, hydrocarbyl, silyl, germyl, halo, cyano, and combinations thereof, said R' having up to 20 non-hydrogen atoms, and optionally, two R' groups (where R' is not hydrogen, halo or cyano) together form a divalent derivative thereof connected to adjacent positions of the cyclopentadienyl ring to form a fused ring structure;

X is a neutral η^4 bonded diene group having up to 30 non-hydrogen atoms, which forms a π-complex with M;

Y is -O-, -S-, -NR*-, -PR*-,

M is titanium or zirconium in the +2 formal oxidation state;

Z* is SiR^*_2, CR^*_2, $SiR^*_2SiR^*_2$, $CR^*_2CR^*_2$, $CR^*=CR^*$, $CR^*_2SiR^*_2$, or GeR^*_2, wherein:

R* each occurrence is independently hydrogen, or a member selected from hydrocarbyl, silyl, halogenated alkyl, halogenated aryl, and combinations thereof, said

R* having up to 10 non-hydrogen atoms, and optionally, two R* groups from Z* (when R* is not hydrogen), or an R* group from Z* and an R* group from Y form a ring system.

17~~14~~. The~~A~~ process according to ~~any of~~ claims 14~~11 to 13~~ performed in the slurry phase.

18~~15~~. The~~A~~ process according to ~~any of~~ claims ~~11 to~~ 14 performed in a multistage polymerization process.

19~~16~~. The~~A~~ process according to claim 18~~15~~ wherein the number of reactors is two.

20~~17~~. The~~A~~ process according to claims 19~~14 to 16~~ wherein the reactors are loop reactors.