half of the TREF curve. The polymer also has a value for Tw1 – Tw2 of less than about -15 °C, wherein Tw1 – Tw2 is a difference of a weight average elution temperature (Tw) for the first half of the TREF curve to a Tw for the second half of the TREF curve.

**[0008a]** In one aspect, there is provided a polymer, comprising ethylene and at least one alpha olefin having from 4 to 20 carbon atoms, wherein the polymer has:

a melt index ratio (MIR) greater than about 40;

a value for Mw1/Mw2 of at least about 2.0, wherein Mw1/Mw2 is a ratio of a weight average molecular weight (Mw) for a first half of a temperature rising elution (TREF) curve from a cross-fraction (CFC) analysis to a Mw for a second half of the TREF curve; and

a value for Tw1 – Tw2 of less than about -15°C, wherein Tw1 – Tw2 is a difference of a weight average elution temperature (Tw) for the first half of the TREF curve to a Tw for the second half of the TREF curve.

**[0009]** Another embodiment provides a polymer that includes ethylene and at least one alpha olefin having from 4 to 20 carbon atoms. The polymer has a density between about 0.915 and about 0.935, an average modulus of greater than about 30,000 psi, a dart impact strength of greater than about 100 g/mil, and a melt index ratio (MIR) greater than about 40. The polymer also lacks a negative inflection point in a van Gurp Palmen (vGP) plot at a frequency of between about 0.1 rad/s and 200 rad/s at 190 °C.

**[0010]** Another embodiment provides a polymer that includes ethylene and at least one alpha olefin having from 4 to 20 carbon atoms. The polymer lacks a negative inflection point in a van Gurp Palmen (vGP) plot at a frequency of between about 0.1 rad/s and 300 rad/s at 190 °C. The polymer also has a melt index ratio (MIR) greater than about 30 and a relationship between average modulus (M) and dart impact strength in g/mil (DIS) complying with the formula $DIS \geq 0.8x[100 + e^{(11.71-0.000268xM+2.183x10^{-9}xM^2)}$.

**[0010a]** In another aspect, there is provided a polymer, comprising ethylene and at least one alpha olefin having from 4 to 20 carbon atoms, wherein the polymer has:

a density between about 0.915 and about 0.935;

an average modulus of greater than about 30,000 psi;

a dart impact strength of greater than about 100 g/mil;

a melt index ratio (MIR) greater than about 40; and

an absence of a negative inflection point in a van Gurp Palmen (vGP) plot at a frequency of between about 0.1 rad/s and 200 rad/s at 190 °C.

8. The polymer of claim 1, comprising polymer chains formed by a catalyst system comprising a compound represented by one of the following formulas:

$$Cp^ACp^BMX_n \text{ or } Cp^A(A)Cp^BMX_n,$$

wherein M is a Group 4, 5, or 6 atom; $Cp^A$ and $Cp^B$ are each bound to M and are independently selected from the group consisting of cyclopentadienyl ligands, substituted cyclopentadienyl ligands, ligands isolobal to cyclopentadienyl and substituted ligands isolobal to cyclopentadienyl; (A) is a divalent bridging group bound to both $Cp^A$ and $Cp^B$ selected from the group consisting of divalent $C_1$ to $C_{20}$ hydrocarbyls and $C_1$ to $C_{20}$ heteroatom containing hydrocarbonyls, wherein the heteroatom containing hydrocarbonyls comprise from one to three heteroatoms; X is a leaving group selected from the group consisting of chloride ions, bromide ions, $C_1$ to $C_{10}$ alkyls, and $C_2$ to $C_{12}$ alkenyls, carboxylates, acetylacetonates, and alkoxides; and n is an integer from 1 to 3.

9. The polymer of claim 1, comprising a ratio of a polymer formed by a first catalyst to a polymer formed by a second catalyst of between about 2:1 and 5:1.

10. A polymer, comprising ethylene and at least one alpha olefin having from 4 to 20 carbon atoms, wherein the polymer has:

a density between about 0.915 and about 0.935;

an average modulus of greater than about 30,000 psi;

a dart impact strength of greater than about 100 g/mil;

a melt index ratio (MIR) greater than about 40; and

an absence of a negative inflection point in a van Gurp Palmen (vGP) plot at a frequency of between about 0.1 rad/s and 200 rad/s at 190 °C.