CLAIMS

What is claimed is:

1. A chromium-based catalyst composition for olefin polymerization, comprising:

(a) at least one inorganic oxide supported chromium catalyst;

(b) at least one particulate material having an average particle size of less than about 5 micron and at least one antistatic agent;

(c) one or more reducing agents; and

(d) optionally, one or more liquid vehicles.

2. The catalyst composition according to claim 1, wherein the particulate material is at least one treated inorganic oxide; or

wherein the average particle size of the particulate material is less than 3 microns; or

wherein the average particle size of the particulate material is less than 1 micron; or

wherein the treated inorganic oxide is a treated silica; or

wherein the inorganic oxide is treated with a reagent so as to reduce surface hydroxyl functionality; or

wherein the reagent to reduce surface hydroxyl functionality is a silane; or

wherein the inorganic oxide is a fumed silica and the reagent is a silane; or

wherein the particulate material is a hydrophobic silica.

3. The catalyst composition according to claim 1, wherein the at least one antistatic agent is in particulate form; or

wherein the antistatic agent has an average particle size of less than 20 micron; or

wherein the antistatic agent is at least one metal carboxylate salt;

wherein the at least one metal carboxylate salt is represented by the formula:

$$M(Q)_x\ (OOCR)_y$$

wherein M is a metal from Group 3 to 16 and the Lanthanide and Actinide series, Q is halogen, hydrogen, a hydroxy or hydroxide, alkyl, alkoxy, aryloxy, siloxy, silane or sulfonate group, R is a hydrocarbyl radical having from 1 to 100 carbon atoms, and x is an integer from 0 to 3 and y is an integer from 1 to 4 and the sum of x and y is equal to the valence of the metal or

wherein the at least one metal carboxylate salt is represented by the formula:

$$(R_1CO_2)_2AlOH$$

wherein R_1 is a hydrocarbyl radical containing from 12 to 30 carbon atoms; or

wherein the at least one metal carboxylate salt comprises an aluminum carboxylate; or

wherein the metal carboxylate salt comprises an aluminum mono-stearate, an aluminum di-stearate, an aluminum tri-stearate, or a combination thereof.

4. The catalyst composition according to any one of claims 1 to 3, wherein the reducing agent comprises an organoaluminum compound; or

wherein the reducing agent comprises an alkyl aluminum alkoxide; or

wherein the reducing agent comprises diethylaluminum ethoxide (DEAlE).

5. The catalyst composition according to claim 1, wherein the chromium catalyst comprises a chromium oxide catalyst, and wherein the reducing agent comprises an aluminum alkyl.

6. The catalyst composition according to claim 1, wherein the bulk density of the solid phase of the composition is increased relative to the bulk density of the solid phase of the composition in the absence of modifier.

7. A method of manufacturing a chromium-based catalyst composition for olefin polymerization comprising combining one or more inorganic oxide supported chromium catalysts with at least one particulate material having an average particle size of less than about 5 micron and one or more antistatic agents and one or more reducing agents.

8. The method according to claim 7, wherein the method comprises the steps of a) combining one or more inorganic oxide supported chromium catalysts with at least one particulate material having an average particle size of less than about 5 micron and one or more antistatic agents in a liquid vehicle and b) adding one or more reducing agents; or

comprising the steps of a) combining one or more inorganic oxide supported chromium catalysts with one or more reducing agents in a liquid

vehicle and b) adding at least one particulate material having an average particle size of less than about 5 micron and one or more antistatic agents.

9. The method according to claim 7 or claim 8, wherein the reducing agent is added to a slurry of inorganic oxide supported chromium catalyst and at least one particulate material having an average particle size of less than about 5 micron and/or one or more antistatic agents in a mix vessel and wherein the addition takes place through an insert tube, said insert tube being directed to the surface of the slurry and away from the walls of the mix vessel.

10. A method of polymerizing olefins comprising contacting under polymerization conditions the catalyst composition according to claim 1 with one or more olefins.