We claim:

1. A process for the preparation of an ultra high molecular weight polyethylene catalyst, comprising:

(1) under inert atmosphere, dispersing a magnesium halide in an inert solvent;

(2) adding an alcohol to react with the magnesium halide, to form a solution or dispersion of a magnesium halide-alcohol adduct;

(3) adding an alkyl aluminum halide to react with the magnesium halide-alcohol adduct, to form an intermediate product;

(4) optionally, subjecting the intermediate product to an ultrasonic wave treatment;

(5) adding a titanium compound to perform Ti-supporting reaction;

(6) optionally, subjecting the reaction mixture from step (5) to an ultrasonic wave treatment; and

(7) recovering solid particles, to obtain the ultra high molecular weight polyethylene catalyst,

wherein at least one of steps (4) and (6) is present.

2. The process of claim 1, wherein the ultrasonic wave treatments in steps (4) and (6) employ the same of different parameters, and an ultrasonic wave frequency ranges from 20 to 300 KHz, an ultrasonic wave power ranges from 30 to 2000W, and ultrasonic wave treatment time ranges from 0.5 to 180 minutes.

3. The process of claim 2, characterized by at least one of the followings:

- the ultrasonic wave frequency ranges from 20 to 100 KHz;
- the ultrasonic wave power ranges from 30 to 500W; and
- the ultrasonic wave treatment time ranges from 0.5 to 60 minutes.

4. The process of claim 2, characterized by at least one of the followings:

- the ultrasonic wave frequency ranges from 30 to 80 KHz;
- the ultrasonic wave power ranges from 40 to 200W; and
- the ultrasonic wave treatment time ranges from 1 to 10minutes.

5. The process of claim 1, wherein step (6) is present, and wherein at the end of the ultrasonic wave treatment in step (6), the reaction mixture is further maintained at a temperature ranging from 30 to 130°C for a period of time ranging from 5 minutes to 3 hours.

6. The process of claim 1, characterized by at least one of the followings:

- the magnesium halide is selected from magnesium dihalides, C_1-C_6 alkoxy magnesium halides, C_1-C_6 alkyl magnesium halides, and mixtures thereof;

- the inert solvent is a C_5 to C_{15} aliphatic or aromatic hydrocarbon solvent;

- the amount of the inert solvent used ranges from 1 to 20 L/mol of the magnesium halide;

- the alcohol is one having from 2 to 20 carbon atoms;

- the amount of the alcohol used ranges from 0.1 to 10 mol, relative to one mole of the magnesium halide;

- in step (2), the reaction between the alcohol and the magnesium halide is carried out at a temperature ranging from 40 to 130°C for a period of time ranging from 10minutes to 5 hours;

- the alkyl aluminum halide is represent by a formula of R_mAlX_{3-m}, wherein R is independently an alkyl having from 1 to 10 carbon atoms; X is independently halogen; and $1 \leq n < 3$;

- the amount of the alkyl aluminum halide used ranges from 0.1 to 8mol, relative to one mole of the magnesium halide; alternatively, the amount of the alkyl aluminum halide used ranges from 0.1 to 1.0mol, relative to one mole of the alcohol;

- in step (3), the reaction between the alkyl aluminum halide and the magnesium halide-alcohol adduct is carried out at a temperature ranging from 0 to 130°C for a period of time ranging from 5 minutes to 3 hours;

- the titanium compound is represent by a formula of $Ti(OR^3)_nX_{4-n}$, wherein R^3 is independently an alkyl having from 1 to 6 carbon atoms, X is independently halogen, and n is an integer ranging from 0 to 4;

- the amount of the titanium compound used ranges from 0.5 to 15mol, relative to one mole of the magnesium halide; and

- in step (5), the Ti-supporting reaction is carried out at a temperature ranging from 0 to 130°C for a period of time ranging from 10 minutes to 5 hours.

7. The process of claim 1, characterized by at least one of the followings:

- the magnesium halide is selected from magnesium dichloride, magnesium dibromide, methyl magnesium chloride, methyl magnesium bromide, methoxy magnesium chloride, methoxy magnesium bromide, ethoxy magnesium chloride, ethoxy magnesium bromide, butoxy magnesium chloride, butoxy magnesium bromide, and mixtures thereof.

- the inert solvent is selected from n-pentane, n-hexane, n-heptane, n-octane, n-decane, cyclic or acyclic isomers of the above, benzene, toluene, and mixtures thereof;

- the alcohol is one having from 2 to 8 carbon atoms;

- the amount of the alcohol used ranges from 2.0 to 6mol, relative to one mole of the magnesium halide;

- the alkyl aluminum halide is selected from diethyl aluminum chloride, ethyl aluminum sesquichloride, ethyl aluminum dichloride, di-n-propyl aluminum chloride, and mixtures thereof;

- the amount of the alkyl aluminum halide used ranges from 0.5 to 5mol, relative to one mole of the magnesium halide; alternatively, the amount of the alkyl aluminum halide used ranges from 0.3 to 0.8mol, relative to one mole of the alcohol;

- the titanium compound is selected from titanium tetrachloride, titanium tetrabromide, tetra-n-butoxy titanium, tetraethoxy titanium, triethoxy titanium chloride, diethoxy titanium dichloride, ethoxy titanium trichloride, tributoxy titanium chloride, and mixtures thereof; and

- the amount of the titanium compound used ranges from 1 to 6mol, relative to one mole of the magnesium halide.

8. An ultra high molecular weight polyethylene catalyst prepared by the process according to any one of claims 1 to 7.

CLAIMS

1. A process for the preparation of an ultra high molecular weight polyethylene catalyst, comprising:

(1) under inert atmosphere, dispersing a magnesium halide in an inert solvent;

(2) adding an alcohol to react with the magnesium halide, to form a solution or dispersion of a magnesium halide-alcohol adduct;

(3) adding an alkyl aluminum halide to react with the magnesium halide-alcohol adduct, to form an intermediate product;

(4) optionally, subjecting the intermediate product to an ultrasonic wave treatment;

(5) adding a titanium compound to perform Ti-supporting reaction;

(6) optionally, subjecting the reaction mixture from step (5) to an ultrasonic wave treatment; and

(7) recovering solid particles, to obtain the ultra high molecular weight polyethylene catalyst,

wherein at least one of steps (4) and (6) is present, and

wherein the ultra high molecular weight polyethylene catalyst is suitable for the preparation of ultra high molecular weight polyethylene having a bulk density ranging from 0.15 to 0.30 g/cm^3.

2. The process of claim 1, wherein the ultrasonic wave treatments in steps (4) and (6) employ the same of different parameters, and an ultrasonic wave frequency ranges from 20 to 300 KHz, an ultrasonic wave power ranges from 30 to 2000W, and ultrasonic wave treatment time ranges from 0.5 to 180 minutes.

3. The process of claim 2, characterized by at least one of the followings:

- the ultrasonic wave frequency ranges from 20 to 100 KHz;
- the ultrasonic wave power ranges from 30 to 500W; and
- the ultrasonic wave treatment time ranges from 0.5 to 60 minutes.

4. The process of claim 2, characterized by at least one of the followings:

- the ultrasonic wave frequency ranges from 30 to 80 KHz;
- the ultrasonic wave power ranges from 40 to 200W; and

- the ultrasonic wave treatment time ranges from 1 to 10minutes.

5. The process of claim 1, wherein step (6) is present, and wherein at the end of the ultrasonic wave treatment in step (6), the reaction mixture is further maintained at a temperature ranging from 30 to 130°C for a period of time ranging from 5 minutes to 3 hours.

6. The process of claim 1, characterized by at least one of the followings:

- the magnesium halide is selected from magnesium dihalides, C_1-C_6 alkoxy magnesium halides, C_1-C_6 alkyl magnesium halides, and mixtures thereof;

- the inert solvent is a C_5 to C_{15} aliphatic or aromatic hydrocarbon solvent;

- the amount of the inert solvent used ranges from 1 to 20 L/mol of the magnesium halide;

- the alcohol is one having from 2 to 20 carbon atoms;

- the amount of the alcohol used ranges from 0.1 to 10 mol, relative to one mole of the magnesium halide;

- in step (2), the reaction between the alcohol and the magnesium halide is carried out at a temperature ranging from 40 to 130°C for a period of time ranging from 10minutes to 5 hours;

- the alkyl aluminum halide is represent by a formula of R_mAlX_{3-m}, wherein R is independently an alkyl having from 1 to 10 carbon atoms; X is independently halogen; and $1 \leq m < 3$;

- the amount of the alkyl aluminum halide used ranges from 0.1 to 8mol, relative to one mole of the magnesium halide; alternatively, the amount of the alkyl aluminum halide used ranges from 0.1 to 1.0mol, relative to one mole of the alcohol;

- in step (3), the reaction between the alkyl aluminum halide and the magnesium halide-alcohol adduct is carried out at a temperature ranging from 0 to 130°C for a period of time ranging from 5 minutes to 3 hours;

- the titanium compound is represent by a formula of $Ti(OR^3)_nX_{4-n}$, wherein R^3 is independently an alkyl having from 1 to 6 carbon atoms, X is independently halogen, and n is an integer ranging from 0 to 4;

- the amount of the titanium compound used ranges from 0.5 to 15mol, relative to one mole of the magnesium halide; and

- in step (5), the Ti-supporting reaction is carried out at a temperature ranging

from 0 to 130°C for a period of time ranging from 10 minutes to 5 hours.

7. The process of claim 1, characterized by at least one of the followings:

- the magnesium halide is selected from magnesium dichloride, magnesium dibromide, methyl magnesium chloride, methyl magnesium bromide, methoxy magnesium chloride, methoxy magnesium bromide, ethoxy magnesium chloride, ethoxy magnesium bromide, butoxy magnesium chloride, butoxy magnesium bromide, and mixtures thereof.

- the inert solvent is selected from n-pentane, n-hexane, n-heptane, n-octane, n-decane, cyclic or acyclic isomers of the above, benzene, toluene, and mixtures thereof;

- the alcohol is one having from 2 to 8 carbon atoms;

- the amount of the alcohol used ranges from 2.0 to 6mol, relative to one mole of the magnesium halide;

- the alkyl aluminum halide is selected from diethyl aluminum chloride, ethyl aluminum sesquichloride, ethyl aluminum dichloride, di-n-propyl aluminum chloride, and mixtures thereof;

- the amount of the alkyl aluminum halide used ranges from 0.5 to 5mol, relative to one mole of the magnesium halide; alternatively, the amount of the alkyl aluminum halide used ranges from 0.3 to 0.8mol, relative to one mole of the alcohol;

- the titanium compound is selected from titanium tetrachloride, titanium tetrabromide, tetra-n-butoxy titanium, tetraethoxy titanium, triethoxy titanium chloride, diethoxy titanium dichloride, ethoxy titanium trichloride, tributoxy titanium chloride, and mixtures thereof; and

- the amount of the titanium compound used ranges from 1 to 6mol, relative to one mole of the magnesium halide.

8. An ultra high molecular weight polyethylene catalyst prepared by the process according to any one of claims 1 to 7.