CLAIMS

1. A method for producing a cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside, comprising preparing a powdery and/or particulate material of an organic compound pre-baked to an extent of containing remaining hydrogen, charging the powdery and/or particulate material in a closed vessel made of a heat resistant material, and subjecting the powdery and/or particulate material together with the vessel to hot isostatic pressing treatment using a compressed gas atmosphere, wherein a maximum ultimate temperature in the hot isostatic pressing treatment is 900°C or more and lower than 2000°C.

2. The production method of Claim 1, wherein a pre-baking temperature is 1000°C or lower.

3. The production method of Claim 1, wherein the closed vessel made of graphite is of triangular screw type having an open pore ratio of less than 20%.

4. The production method of Claim 1, wherein hot isostatic pressing treatment is carried out in such a state that a part or the whole of periphery of the pre-baked powdery and/or particulate material of an organic compound charged in the closed vessel made of graphite is covered with a spacer and a sleeve.

5. The production method of Claim 1, wherein one or more carbon materials selected from the group consisting of carbon fiber, natural graphite, artificial graphite, glassy carbon and amorphous carbon are mixed to the pre-baked powdery and/or particulate material of an organic compound.

6. A method for producing a cluster of graphite crystals, in which the thin sheet graphite crystals are partly cleaved, comprising preparing an intercalation compound of graphite composed of , as a host material, the cluster of thin sheet graphite crystals produced by the method of claim 1, and subjecting the intercalation compound to rapid heating.

7. A cluster of thin sheet graphite crystals composed of aggregates in such state that thin sheet graphite crystals extend from

the inside toward the outside.

8. A cluster of graphite crystals obtained by partly cleaving the thin sheet graphite crystals of the cluster of thin sheet graphite crystals of claim 7.

9. A method for producing a nano-silicon material of one-dimensional shape, comprising preparing a powdery and/or particulate material of an organic compound pre-baked to an extent of containing remaining hydrogen, mixing a silicon powder thereto, charging the mixture in a closed vessel made of a heat resistant material, and subjecting the mixture together with the vessel to hot isostatic pressing treatment using a compressed gas atmosphere, wherein a maximum ultimate temperature in the hot isostatic pressing treatment is 1320°C or more and lower than 2000°C.

10. A method for producing a graphite-silicon composite material, comprising a cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside and a nano-silicon material of one-dimensional shape, the method comprises preparing a powdery and/or particulate material of an organic compound pre-baked to an extent of containing remaining hydrogen, mixing a silicon powder thereto, charging the mixture in a closed vessel made of a heat resistant material, and subjecting the mixture together with the vessel to hot isostatic pressing treatment using a compressed gas atmosphere, wherein a maximum ultimate temperature in the hot isostatic pressing

treatment is 1320°C or more and lower than 2000°C.

11. The production method of any of Claims 9 or 10, wherein the silicon powder is one having a particle size of less than 500 μm.

12. A graphite-silicon composite material comprising a cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside and a nano-silicon material of one-dimensional shape.

13. A method for producing thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof which are dispersed in a solvent, comprising dispersing in a solvent a pulverized resultant of a mass of thin sheet graphite crystals composed of aggregates of thin sheet graphite crystals, subjecting the dispersion to ultrasonic wave treatment and centrifuging, and collecting a supernatant therefrom.

14. A method for producing thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof, comprising distilling-off the solvent from the thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals

thereof of claim 13 which are dispersed in a solvent.

15. The production method of Claim 13 or 14, wherein the mass of thin sheet graphite crystals composed of aggregates of thin sheet graphite crystals is a cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside.

16. Thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof which are dispersed in a solvent and comprise multi-layer graphene having a thickness of not more than 10 nm.

17. Thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof which comprise multi-layer graphene having a thickness of not more than 10 nm.

CLAIMS

1. A method for producing a cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside, comprising preparing a powdery and/or particulate material of an organic compound pre-baked to an extent of containing remaining hydrogen, charging the powdery and/or particulate material in a closed vessel made of a heat resistant material, and subjecting the powdery and/or particulate material together with the vessel to hot isostatic pressing treatment using a compressed gas atmosphere, wherein a maximum ultimate temperature in the hot isostatic pressing treatment is 900°C or more and lower than 2000°C.

2. The production method of Claim 1, wherein a pre-baking temperature is 1000°C or lower.

3. The production method of Claim 1, wherein the closed vessel made of graphite is of triangular screw type having an open pore ratio of less than 20%.

4. The production method of Claim 1, wherein hot isostatic pressing treatment is carried out in such a state that a part or the whole of periphery of the pre-baked powdery and/or particulate material of an organic compound charged in the closed vessel made of graphite is covered with a spacer and a sleeve.

5. The production method of Claim 1, wherein one or more carbon materials selected from the group consisting of carbon fiber, natural graphite, artificial graphite, glassy carbon and amorphous carbon are mixed to the pre-baked powdery and/or particulate material of an organic compound.

6. A method for producing a cluster of graphite crystals, in which the thin sheet graphite crystals are partly cleaved, comprising preparing an intercalation compound of graphite composed of , as a host material, the cluster of thin sheet graphite crystals produced by the method of Claim 1, and subjecting the intercalation compound to rapid heating.

7. A method for producing a graphite-silicon composite material, comprising a cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside and a nano-silicon material of one-dimensional shape, the method comprises preparing a powdery and/or particulate material of an organic compound pre-baked to an extent of containing remaining hydrogen, mixing a silicon powder thereto, charging the mixture in a closed vessel made of a heat resistant material, and subjecting the mixture together with the vessel to hot isostatic pressing treatment using a compressed gas atmosphere, wherein a maximum ultimate temperature in the hot isostatic pressing treatment is 1320°C or more and lower than 2000°C.

8. The production method of Claim 7, wherein the silicon powder is one having a particle size of less than 500 μm.

9. A method for producing thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof which are dispersed in a solvent, comprising dispersing in a solvent a pulverized resultant of the cluster of thin sheet graphite crystals composed of aggregates in such a state that thin sheet graphite crystals extend from the inside toward the outside that is produced according to the method of Claim 1, subjecting the dispersion to ultrasonic wave treatment and centrifuging, and collecting a supernatant therefrom.

10. A method for producing thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof, comprising distilling-off the solvent from the thin sheet graphite crystals and/or wrinkled and shrunk graphite crystals thereof and/or roll-shaped graphite crystals thereof of claim 9 which are dispersed in a solvent.