CLAIMS

1. A gas barrier plastic molded product comprising a plastic molded product and a gas barrier thin film provided on the surface of the plastic molded product, in which

the gas barrier thin film contains silicon (Si), carbon (C), oxygen (O) and hydrogen (H) as constituent elements, and comprises a Si-containing layer having a Si content percentage represented by (Mathematical Formula 1) of 40.1% or more:

(Mathematical Formula 1)

Si content percentage [%] = {(Si content [atomic%]) / (total content of Si, O and C [atomic%])} × 100

wherein in Mathematical Formula 1, the content of Si, O or C is a content thereof in the items of the three elements of Si, O and C.

2. The gas barrier plastic molded product according to claim 1, wherein the C content percentage represented by (Mathematical Formula 2) in the Si-containing layer is 22.8% to 45.5%:

(Mathematical Formula 2)

C content percentage [%] = {(C content [atomic%]) / (total content of Si, O and C [atomic%])} × 100

wherein in Mathematical Formula 2, the content of Si, O or C is a content thereof in the items of the three elements of Si, O and C.

3. The gas barrier plastic molded product according to claim

1 or 2, wherein the O content percentage represented by (Mathematical Formula 3) in the Si-containing layer is 2.0% to 35.8%:

(Mathematical Formula 3)

O content percentage [%] = {(O content [atomic%]) / (total content of Si, O and C [atomic%])} × 100

wherein in Mathematical Formula 3, the content of Si, O or C is a content thereof in the items of the three elements of Si, O and C.

4. The gas barrier plastic molded product according to any one of claims 1 to 3, wherein the hydrogen content percentage in the Si-containing layer is 21 atomic% to 46 atomic%.

5. The gas barrier plastic molded product according to any one of claims 1 to 4, wherein the density of the gas barrier thin film is 1.30 g/cm^3 to 1.47 g/cm^3.

6. The gas barrier plastic molded product according to any one of claims 1 to 5, wherein when the Si-containing layer is subjected to an X-ray photoelectron spectroscopic analysis under condition (1), the spectrum contains a region where a main peak is observed, at the peak appearance position of the bonding energy between Si and Si:

Condition (1): The measurement range is set to 95 eV to 105 eV.

7. The gas barrier plastic molded product according to any one of claims 1 to 6, wherein when the Si-containing layer is subjected to an X-ray photoelectron spectroscopic analysis under condition (2), no peak is observed at the peak appearance position of the bonding energy between Si and Si:

Condition (2): The measurement range is set to 120 eV to 150 eV.

8. The gas barrier plastic molded product according to any one of claims 1 to 7, wherein the gas barrier thin film is formed by a heating element CVD method.

9. The gas barrier plastic molded product according to any one of claims 1 to 8, wherein the film thickness of the gas barrier thin film is 5 nm or larger.

10. The gas barrier plastic molded product according to any one of claims 1 to 9, wherein the plastic molded product is a container, a film, or a sheet.

11. A method for producing a gas barrier plastic molded product, the method comprising a film-forming process of forming a gas barrier thin film by bringing a raw material gas into contact with a heating element that has generated heat, decomposing the raw material gas to produce a chemical species, and causing the chemical species to arrive at the surface of the plastic molded product,

wherein an organosilane-based compound represented by formula (Chemical Formula 1) is used as the raw material gas,

a material containing one or two or more metal elements selected from the group consisting of Mo, W, Zr, Ta, V, Nb and Hf is used as the heating element, and

the heat generation temperature of the heating element is set to 1550°C to 2400°C:

(Chemical Formula 1)

H_3Si-Cn-X

wherein in Chemical Formula 1, n represents 2 or 3; and X represents SiH_3, H, or NH_2.

12. The method for producing a gas barrier plastic molded product according to claim 11, wherein the organosilane-based compound represented by the formula (Chemical Formula 1) is vinylsilane, disilabutane, disilylacetylene, or 2-aminoethylsilane.

13. The method for producing a gas barrier plastic molded product according to claim 11 or 12, wherein as the heating element, tantalum metal, a tantalum-based alloy, or tantalum carbide is used; tungsten metal, a tungsten-based alloy, or tungsten carbide is used; molybdenum metal, a molybdenum-based alloy, or molybdenum carbide is used; or hafnium metal, a hafnium-based alloy, or hafnium carbide is used.

CLAIMS

1. A gas barrier plastic molded product comprising a plastic molded product and a gas barrier thin film provided on the surface of the plastic molded product, in which

the gas barrier thin film contains silicon (Si), carbon (C), oxygen (O) and hydrogen (H) as constituent elements, and comprises a Si-containing layer having a Si content percentage represented by (Mathematical Formula 1) of 40.1% or more:

(Mathematical Formula 1)

Si content percentage [%] = {(Si content [atomic%]) / (total content of Si, O and C [atomic%])} × 100

wherein in Mathematical Formula 1, the content of Si, O or C is a content thereof in the items of the three elements of Si, O and C.

2. The gas barrier plastic molded product according to claim 1, wherein the C content percentage represented by (Mathematical Formula 2) in the Si-containing layer is 22.8% to 45.5%:

(Mathematical Formula 2)

C content percentage [%] = {(C content [atomic%]) / (total content of Si, O and C [atomic%])} × 100

wherein in Mathematical Formula 2, the content of Si, O or C is a content thereof in the items of the three elements of Si, O and C.

3. The gas barrier plastic molded product according to claim 1 or 2, wherein the O content percentage represented by (Mathematical Formula 3) in the Si-containing layer is 2.0% to 35.8%:

(Mathematical Formula 3)

O content percentage [%] = {(O content [atomic%]) / (total content

of Si, O and C [atomic%])} × 100

wherein in Mathematical Formula 3, the content of Si, O or C is a content thereof in the items of the three elements of Si, O and C.

4. The gas barrier plastic molded product according to any one of claims 1 to 3, wherein the hydrogen content percentage in the Si-containing layer is 21 atomic% to 46 atomic%.

5. The gas barrier plastic molded product according to any one of claims 1 to 4, wherein the density of the gas barrier thin film is 1.30 g/cm^3 to 1.47 g/cm^3.

6. The gas barrier plastic molded product according to any one of claims 1 to 5, wherein when the Si-containing layer is subjected to an X-ray photoelectron spectroscopic analysis under condition (1), the spectrum contains a region where a main peak is observed, at the peak appearance position of the bonding energy between Si and Si:

Condition (1): The measurement range is set to 95 eV to 105 eV.

7. The gas barrier plastic molded product according to any one of claims 1 to 6, wherein when the Si-containing layer is subjected to an X-ray photoelectron spectroscopic analysis under condition (2), no peak is observed at the peak appearance position of the bonding energy between Si and Si:

Condition (2): The measurement range is set to 120 eV to 150 eV.

8. The gas barrier plastic molded product according to any one of claims 1 to 7, wherein the gas barrier thin film is formed by a heating element CVD

method.

9. The gas barrier plastic molded product according to any one of claims 1 to 8, wherein the film thickness of the gas barrier thin film is 5 nm or larger.

10. The gas barrier plastic molded product according to any one of claims 1 to 9, wherein the plastic molded product is a container, a film, or a sheet.

11. A method for producing a gas barrier plastic molded product, the method comprising a film-forming process of forming a gas barrier thin film by bringing a raw material gas into contact with a heating element that has generated heat, decomposing the raw material gas to produce a chemical species, and causing the chemical species to arrive at the surface of the plastic molded product,

wherein an organosilane-based compound represented by formula (Chemical Formula 1) is used as the raw material gas,

the organosilane-based compound represented by the formula (Chemical Formula 1) is vinylsilane, disilabutane, disilylacetylene, or 2-aminoethylsilane,

a material containing one or two or more metal elements selected from the group consisting of Mo, W, Zr, Ta, V, Nb and Hf is used as the heating element, and

the heat generation temperature of the heating element is set to 1550°C to 2400°C:

(Chemical Formula 1)

$H_3Si-Cn-X$

wherein in Chemical Formula 1, n represents 2 or 3; and X represents SiH_3,

H, or NH_2.

12. The method for producing a gas barrier plastic molded product according to claim 11, wherein as the heating element, tantalum metal, a tantalum-based alloy, or tantalum carbide is used; tungsten metal, a tungsten-based alloy, or tungsten carbide is used; molybdenum metal, a molybdenum-based alloy, or molybdenum carbide is used; or hafnium metal, a hafnium-based alloy, or hafnium carbide is used.