What is claimed:

1. A preparation method for a high-refractive-index hydrogenated silicon film, characterized by comprising following steps:

   (a) depositing, by means of magnetron Si target sputtering, Si on a base body to form a silicon film;

   (b) the silicon film forming an oxygen-containing hydrogenated silicon film in an environment containing active hydrogen and active oxygen, an amount of the active oxygen accounting for 4~99% of a total amount of the active hydrogen and the active oxygen, or,

   the silicon film forming a nitrogen-containing hydrogenated silicon film in an environment containing active hydrogen and active nitrogen, an amount of the active nitrogen accounting for 5~20% of a total amount of the active hydrogen and the active nitrogen.

2. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 1, characterized in that in Step (b), the amount of the active oxygen accounts for 4~70% of the total amount of the active hydrogen and the active oxygen, or, the amount of the active nitrogen accounts for 5~18% of the total amount of the active hydrogen and the active nitrogen;

   preferably, in Step (b), the amount of the active oxygen accounts for 5~20% of the total amount of the active hydrogen and the active oxygen, or, the amount of the active nitrogen accounts for 5~10% of the total amount of the active hydrogen and the active nitrogen.

3. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 1 or 2, characterized by comprising following steps:

   (a) depositing, by means of MF magnetron Si target sputtering, Si on a base body to form a silicon film, in the presence of an inert gas;

   (b) activating the mixed gas through RF or ICP, in the presence of a mixed gas of hydrogen, oxygen, and an inert gas, to form plasmas which react with the silicon film, forming the oxygen-containing hydrogenated silicon film, wherein the oxygen accounts for 4~99% of the hydrogen-oxygen mixed gas in percentage by volume, preferably 4~70%, and further preferably 5~20%, or,

   activating the mixed gas through RF or ICP, in the presence of a mixed gas of hydrogen, nitrogen, and an inert gas, to form plasmas which react with the silicon film, forming the nitrogen-containing hydrogenated silicon film, wherein the nitrogen accounts for 5~20% of the hydrogen-nitrogen mixed gas in percentage by volume, preferably 5~18%, and further preferably 5~10%.

4. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 3, characterized in that a power of the Si target sputtering in Step (a) is 5%-80% of a rated power, preferably 20%-80%, further preferably 40%-80%, further preferably 40%-70%, and further preferably 50%-70%; and/or, a power of activating the mixed gas through RF or ICP in Step (b) is 5%-80% of a rated power, preferably 5%-50%, further preferably 15%-50%, and further preferably 20%-50%.

5. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 3, characterized by comprising following steps:

   (a) placing a clean base body on a rotation mechanism of a vacuum sputtering reaction film coating machine, with a film coating face facing a target material, the rotation mechanism rotating at a constant speed in a film coating chamber; and starting, when a vacuum degree inside the film coating chamber is higher than 10^{-3}Pa, a sputter source and introducing argon to deposit Si on the base body by means of MF magnetron Si target sputtering, forming a silicon film; and

   (b) driving, along with the rotation of the rotation mechanism, the base body to a reaction source area; and starting the reaction source and introducing hydrogen, oxygen, and argon to form plasmas which react with the silicon film, forming the oxygen-containing hydrogenated silicon film, the reaction source being an RF or ICP plasma activation source,

   wherein a power of the sputter source is 5%-80% of a rated power, a power of the reaction source is 5%-80% of a rated power, and the oxygen introduced accounts for 4~99% of the total amount of the hydrogen and oxygen introduced in percentage by volume.

6. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 3, characterized by comprising following steps:

   (a) placing a clean base body on a rotation mechanism of a vacuum sputtering reaction film coating machine, with a film coating face facing a target material, the rotation mechanism rotating at a constant speed in a film coating chamber; and starting, when a vacuum degree inside the film coating chamber is higher than 10^{-3}Pa, a sputter source and introducing argon to deposit Si on the base body by means of MF magnetron Si target sputtering, forming a silicon film;

   (b) driving, along with the rotation of the rotation mechanism, the base body to a reaction source area; and starting the reaction source and introducing hydrogen, nitrogen, and argon to form plasmas which react with the silicon film, forming an nitrogen-containing hydrogenated silicon film, the reaction source being an RF or ICP plasma activation source;

wherein a power of the sputter source is 5%-80% of a rated power, a power of the reaction source is 5%-80% of a rated power, and the nitrogen introduced accounts for 5~20% of a total amount of the hydrogen and nitrogen introduced, in percentage by volume.

7. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 5 or 6, characterized in that the rotation mechanism is one selected from a turn plate, a drum, and a rotating stand.

8. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 5 or 6, characterized in that the film coating chamber is provided with a baffle configured to divide the film coating chamber into a first chamber, in which the sputter source is located, and a second chamber, in which the reaction source is located.

9. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 5 or 6, characterized in that the film coating chamber is provided with a gas mixing chamber, hydrogen, oxygen, and argon are respectively introduced to the gas mixing chamber, and after being mixed well, the mixed gas is introduced to the film coating chamber to be activated; or,

   hydrogen, nitrogen, and argon are respectively introduced to the gas mixing chamber, and after being mixed well, the mixed gas is introduced to the film coating chamber to be activated.

10. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 5 or 6, further characterized by comprising, in Step (a), before starting the sputter source, heating the base body to a base body temperature of 100-300ºC, and subsequently, introducing argon to bombard and clean the film coating chamber and the base body; and shutting off the argon after the cleaning is completed, and vacuuming the film coating chamber again to a vacuum degree of higher than 10^{-3}Pa;

    preferably, the bombarding and cleaning lasts for 1~5min, and a bombarding power is 5%-80% of a rated power.

11. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 5 or 6, further characterized by comprising, after Step (b) is ended, annealing the oxygen-containing hydrogenated silicon film or the nitrogen-containing hydrogenated silicon film in an annealing furnace at 100-300ºC for 60-180min.

12. The preparation method for a high-refractive-index hydrogenated silicon film according to claim 9, characterized in that annealing the oxygen-containing hydrogenated silicon film or the nitrogen-containing hydrogenated silicon film in an annealing furnace comprises:

heating the oxygen-containing hydrogenated silicon film or the nitrogen-containing hydrogenated silicon film to 100-300ºC at a heating velocity of 1-15ºC/min for 30-60min;

keeping the oxygen-containing hydrogenated silicon film or the nitrogen-containing hydrogenated silicon film at a constant temperature of 100-300ºC for 30-120min; and

cooling the oxygen-containing hydrogenated silicon film or the nitrogen-containing hydrogenated silicon film to an ambient temperature at a cooling velocity of 10-30ºC/min.