CLAIMS

1. A preparation method of a silver-modified spiral TiO_2 nano-fiber photocatalyst, comprising the following steps:

S1. preparing a spiral TiO_2 nano-fiber: transcribing the structure of amino acid derivatives to prepare the spiral TiO_2 nano-fiber,

wherein specific operations of step S1 are: weighing 0.10-0.15 g of C_{18}-D-glutamic acid to be dissolved in 45.3-68.0 g of methanol solution, adding 270-400 mL of deionized water, and stirring at the room temperature for 10 min to prepare a mixed solution; then weighing 0.97-1.45 g of bis(2,4-pentanedionate)bis(2-pyruvate)titanium to be added in the mixed solution, stirring at 55ºC for 2 hours to obtain an intermediate product; centrifugally separating the obtained intermediate product, freezing and drying at -60ºC overnight to obtain a light yellow powder; and calcining the light yellow powder at 550ºC for 6 hours to obtain a white powder, the white powder being the spiral TiO_2 nano-fiber;

S2. preparing a nano-silver aqueous solution: preparing the stable nano-silver aqueous solution with a uniform particle size based on a Tollens reaction,

wherein the specific operations of step S2 are: mixing a silver nitrate solution with the mass fraction of 24-30% and ammonium hydroxide with the mass fraction of 28-34% to prepare reagent A, mixing a sodium hydroxide solution with the mass fraction of 7-12% and ammonium hydroxide with the mass fraction of 6-10% to prepare reagent B, and mixing formaldehyde with the mass fraction of 0.3% and sorbitol with the mass fraction of 27-33% to prepare reagent C; adding 0.5 mL of the reagent A to 14 mL of deionized water, adding 0.5 mL of the reagent B, and filling to volume of 300 mL to prepare reagent SAB; individually filling 0.5 mL of the reagent C to volume of 300 mL to prepare reagent SC; and mixing 0.9 mL of the reagent SAB and 0.9 mL of the reagent SC with 10 mL of water, sealing and placing in a numerical control ultrasonic vibrator for ultrasonic vibration to obtain the nano-silver particle aqueous

solution; wherein the ultrasonic vibration times are 15 min, 27 min, and 33 min to obtain three nano-silver particle aqueous solutions the particle diameters of the nano-silver particles are 4-6 nm, 12-14 nm, and 30-32 nm, respectively; and

S3. preparing a silver-modified spiral TiO_2 nano-fiber photocatalyst: modifying the nano-silver particles prepared in step S2 onto the spiral TiO_2 nano-fiber prepared in step S1 by using a chemical deposition method,

wherein the specific operations of step S3 are: weighing three parts of 0.2 g of silver-modified spiral TiO_2 nano-fibers prepared in step S1, and respectively dissolving in three kinds of 100 mL nano-silver aqueous solutions prepared in step S2; adjusting pH of three mixtures to 3.5 with perchloric acid, stirring at the room temperature for 60 min, and then continuously stirring for 40 min at a nitrogen atmosphere under irradiation of a 8 W ultraviolet lamp; and centrifugally separating a product, washing the product multiple times with double-distilled water, and finally drying at 80ºC for 8 hours to obtain three parts of brown powders with different chromaticity, i.e., small-sized, middle-sized, and large-sized nano-silver particle-modified spiral TiO_2 nano-fibers.

2. The preparation method of a silver-modified spiral TiO_2 nano-fiber photocatalyst according to claim 2, wherein an average length of the prepared spiral TiO_2 nano-fiber is about 500 nm, and an average diameter thereof is about 40 nm.

3. The preparation method of a silver-modified spiral TiO_2 nano-fiber photocatalyst according to claim 1, wherein the loading amounts of nano-silvers with the particle diameters of 4-6nm, 12-14nm, and 30-32 nm ~~with different sizes~~ are 3.3%, 3.1%, and 3.1%, respectively according to the sizes in an ascending order.

4. An application of a silver-modified spiral TiO_2 nano-fiber photocatalyst obtained by the preparation method according to any one of claims 1- 3 to degradation of organic pollutants and inactivation of pathogenic bacteria in water environment.

5. An application of a 12-14nm silver-modified spiral TiO_2 nano-fiber photocatalyst obtained by the preparation method according to claim 1 to degradation of ethinyloestradiol and inactivation of escherichia coli.