[CLAIMS]

[Claim 1]

An inorganic oxide-based photocatalyst comprising:

an inorganic oxide; and

a ferrocene-derived iron oxide layer formed on the inorganic oxide,

wherein iron is contained in the ferrocene-derived iron oxide layer in an amount of 0.001 to 3 wt% compared to the inorganic oxide.

[Claim 2]

The inorganic oxide-based photocatalyst of claim 1, wherein the ferrocene-derived iron oxide layer is obtained by performing a heat treatment process on ferrocene deposited on the inorganic oxide.

[Claim 3]

The inorganic oxide-based photocatalyst of claim 1, wherein the inorganic oxide includes at least one selected from the group consisting of oxides including at least one of Ti, Zn, Al, and Sn.

[Claim 4]

The inorganic oxide-based photocatalyst of claim 1, wherein the inorganic oxide includes at least one selected from the group consisting of a bead form, a powder form, a rod form, a wire form, a needle form, and a fiber form, and the inorganic oxide has a size of 1 nm to 500 μm.

[Claim 5]

An inorganic oxide-based photocatalyst comprising:

an inorganic oxide; and

a ferrocene-derived iron oxide layer formed on the inorganic oxide,

wherein the inorganic oxide does not contain iron,

wherein the ferrocene-derived iron oxide layer is obtained by performing a heat treatment process on ferrocene deposited on the inorganic oxide,

wherein the inorganic oxide-based photocatalyst has photoactivity in a visible light region of 400 nm or more.

[Claim 6]

The inorganic oxide-based photocatalyst of claim 1 or claim 5, wherein the inorganic oxide-based photocatalyst has photoactivity in a dry condition of 30% or less humidity.

[Claim 7]

The inorganic oxide-based photocatalyst of claim 1 or claim 5, wherein the ferrocene-derived iron oxide includes one or more of compounds represented by the following Chemical Formula 1:

[Chemical Formula 1]

$Fe_XO_YH_Z$

(X, Y, and Z are each selected from 0 to 3, and X and Y are not 0).

[Claim 8]

The inorganic oxide-based photocatalyst of claim 1 or claim 5, wherein the inorganic oxide-based photocatalyst has a specific surface area of 5 m^2/g or more and an average pore size of 50 nm or less.

[Claim 9]

A photocatalyst composition comprising the inorganic oxide-based photocatalyst of claim 1 or claim 5, wherein the photocatalyst is contained in an amount of 0.01 to 99 wt% in the photocatalyst composition.

[Claim 10]

A product having a photolysis function, the product comprising the inorganic oxide-based photocatalyst of claim 1 or claim 5.

[Claim 11]

The product of claim 10, wherein the product is a molded body in which the inorganic oxide-based photocatalyst is coated on a substrate, or which includes the inorganic oxide-based photocatalyst.

[Claim 12]

The product of claim 10, wherein the product is applied to building materials for air purification having a function of photolyzing acidic gases and organic substances.

[Claim 13]

The product of claim 12, wherein the building materials for air purification is one or more of paints, wallpapers, blinds, sidewalk blocks, median separators, artificial turf, artificial turf filler, elastic pavement materials, flooring materials, asphalt, concrete, and elastic mats.

[Claim 14]

A method for preparing an inorganic oxide-based photocatalyst, the method comprising steps of:

preparing an inorganic oxide;

forming a ferrocene layer on the inorganic oxide; and

forming a ferrocene-derived iron oxide layer by performing a heat treatment process after the step of forming the ferrocene layer,

wherein the step of forming the ferrocene-derived iron oxide layer includes steps of: performing a first heat treatment process at a temperature of 100 to 300°C; and performing a second heat treatment process at a temperature of 500 to 900°C.

[Claim 15]

The method of claim 14, wherein the step of forming the ferrocene layer is performed by using a wet coating method, a sputtering method, or a deposition method, the

step of forming the ferrocene layer is carried out at room temperature to 120°C, and the ferrocene layer includes 0.001 to 20 wt% of ferrocene compared to the inorganic oxide.

[Claim 16]

The product of claim 14, wherein the step of forming the ferrocene layer is forming a ferrocene deposition layer using temperature-regulated chemical vapor deposition (TR-CVD).