Claims

1. A carbon-based composite material, which is characterized in that the carbon-based composite material comprises the substrate, carbon film and structural carbon; the carbon film is bonded to the substrate surface and the structural carbon is bonded to the carbon film forming one body; wherein the carbon film has an average thickness from 0.001 nm to 1 mm, wherein the structural carbon has any shape and structure, wherein the carbon film is continuously or discontinuously covering the substrate, wherein the substrate comprises solid material at room temperature and conductive and nonconductive materials; the carbon-based composite material is any shapes and structure; the carbon-based composite material comprises at least one kind substrate, one kind carbon film and one kind structural carbon; the carbon-based composite material has a surface area ranging from 0.001 square nanometers to 1 billion square meters

2. The carbon-based composite material according to claim 1, which is characterized in that the carbon-based composite material comprises carbon element and at least one kind of alkali metal element and/or at least one kind of alkaline earth metal element; wherein the carbon film and structural carbon both comprise carbon and comprise at least one kind of alkali metal element and/or at least one kind of alkaline earth metal element, and do not comprise or comprise at least one kind of the elements excluding the carbon, alkali metal and alkaline earth metal elements, the alkali metal comprises Li, Na, K, Rb, Ce or Fr, the alkaline earth metal comprises Be, Mg, Ca, Sr, Ba, or Ra.

3. The carbon-based composite material according to claim 1, which is characterized in that the carbon-based composite material comprises at least one kind of substrate, carbon film and structural carbon, wherein the substrate is continuously or discontinuously covered by at least one kind of the carbon film and structural carbon; wherein the carbon-based composite material has a surface area from 0.001 square nanometers to 1 billion square meters.

4. The carbon-based composite material according to claim 1, which is characterized in that the carbon film is a carbon-based composite material; the carbon film contains carbon

element and at least one kind of other elements; the content of alkali metal and/or alkaline earth metal element is 0.0000000000001wt% - 99.9999wt%; the content of the other elements is 0.0000000000001wt% - 99.9999wt%, the other elements comprise all elements excluding the carbon element, an average thickness of the carbon film is 0.001 nm-1 mm; the carbon film is continuous or discontinuous covering the substrate.

5. The carbon-based composite material according to claim 1, which is characterized in that the structural carbon is a carbon-based composite material; the structural carbon contains carbon element and at least one kind of other elements; the content of alkali metal and/or alkaline earth metal elements is 0.0000000000001wt% - 99.9999wt%; the content of the other elements is 0.0000000000001wt% - 99.9999wt%, the other elements comprise all elements excluding the carbon element, the structural carbon comprises the carbon containing material with any shapes and structure.

6. The carbon-based composite material according to claims 1-5, characterized in that the carbon film and structural carbon modify all chemical and physical properties of all solid materials and conductive and nonconductive materials to produce the carbon-based based composite material with better performances, and wherein the chemical and physical properties comprise all aspects of material property.

7. A preparation method of carbon-based composite material according to any one of claims 1-6, which is characterized in that it comprises the following steps:
(A1) a catalyst mixture is coated on a substrate surface followed by drying under required conditions;
(A2) the substrate loaded with catalyst mixture is placed in a heating furnace with certain atmosphere, followed by heating the heating furnace to a temperature of -50-1500℃ and temperature holding of 0-1000 hours to realize one or more of the purposes comprising to decompose, melt, mix evenly the catalyst mixture and let the catalyst infiltrate the substrate surface;
(A3) the atmosphere in the heating furnace is adjusted to replace the atmosphere in the step (A2), followed by adjusting the heating furnace to the reaction temperature of -50-1500℃ and adjusting the atmosphere in the heating furnace according to the need, then the carbon containing organic matter is inlet into the heating furnace followed by temperature holding of 0-1000 hours to let the carbon containing organic matter react under an action of the

catalyst mixture to form the carbon film and the structural carbon on the substrate;

(A4) the heating furnace is turn off and its atmosphere is adjusted as needed to let furnace cool to -50-100℃ to obtain the carbon-based composite material;

or includes the following steps:

(B1) the catalyst mixture is coated on the substrate surface followed by drying and coating the carbon containing organic matter to prepare the reaction precursor; or the catalyst mixture is mixed with the substrate followed by mixing with carbon containing organic matter to prepare the reaction precursor;

(B2) the reaction precursor is heated in a heating furnace with required atmosphere to a temperature of -50-1500℃ followed by temperature holding of 0-1000 hours to generate the carbon film covering the substrate and the structural carbon on a surface of the carbon film;

(B3) the heating furnace is turn off to let the furnace cool to -50-100℃ to obtain carbon based composite material;

in step (B1), it is particularly suitable to mix the particulate substrate with the catalyst mixture and carbon containing organic matter to produce the reaction precursor; whilst, it is particularly suitable to coat the catalyst mixture and carbon containing organic matter on the thin film, plate and bulk substrate to produce the reaction precursor.

8. The preparation method of carbon-based composite material according to claim 7, which is characterized in that the catalyst mixture is continuously or discontinuously coated on the substrate by any realizable methods including spraying, dipping, wiping, scraping, brushing, drenching, wiping, roller coating or printing.

9. The preparation method of carbon-based composite material according to claim 7, which is characterized in that the catalysts comprise at least one of simple substances, organic compounds, or inorganic compounds of alkali metal and alkaline earth metal element, or their mixtures; herein the alkali metal comprises Li, Na, K, Rb, Ce or Fr, and the alkaline earth metal comprises Be, Mg, Ca, Sr, Ba, or Ra.

10. The preparation method of carbon-based composite materials according to claim 7, which is characterized in that the catalyst mixture comprises uniformly dispersed solution, suspension, paste or powder of one or more catalysts, and a content of the one or more catalysts in the catalyst mixture is 0.000000001wt%-99.99wt%.

11. The preparation method of carbon-based composite material according to claim 7, which is characterized in that the catalyst mixture comprises or does not comprise at least one of additives, surfactant or thickeners or their mixture; the additives include any compounds for controlling a morphology of the structural carbon and preparing the carbon-based composite materials comprising at least one kind of carbon-based composite material and/or compound-substrate carbon-based composite material; the mass fraction of additives, surfactant or thickeners in the catalyst mixture is 0-99.999900000%;

12. The preparation method of carbon-based composite material according to claim 6, which is characterized in that the carbon containing organic matter comprises at least one of natural or synthetic carbon containing matters, or their mixture, the carbon containing organic matter comprises at least one of alcohols, organic acids, alkenes, alkanes, alkynes, ketones, various carbonaceous gases, sugars or various resins or the mixtures of the above substances.

13. A product which is characterized in that the product comprises at least one kind of the carbon-based composite materials according to claim 1, 2, 3, 4, 5 or 6, wherein the carbon-based composite material comprises at least one kind of substrate, carbon film and structural carbon, wherein the substrate is continuously or discontinuously covered by at least one kind of carbon film and structural carbon.

14. Use of the product according to claim 13, comprising in binderless positive and negative electrode, positive and negative electrode materials of all kinds of batteries, binderless electrode and electrode material of all kinds of capacitors, catalyst and catalyst support for all kinds of reactions, hydrogen storage, reinforcing materials, field emission electrodes, biosensors, gas sensors, infrared sensors and other sensors, solar cell electrodes, electrolytic water hydrogen production electrodes, photocatalytic hydrogen production materials, infrared detector electrodes, heat exchange materials, electromagnetic wave absorption and emission materials, conductive material, or incorporated into an assembly or material.