GRAPHENE NANOSHEET BY MULTIPLE MEDIUM CONTROLLED ZERO-POINT POTENTIAL MODULATION AND MANUFACTURING METHOD OF THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Taiwan Patent Application No. 111206831, filed on June 28, 2022, in the Taiwan Intellectual Property Office, the content of which are hereby incorporated by reference in their entirety for all purposes.

BACKGROUND OF THE INVENTION

1. Field of Invention

[0002] The invention relates to a graphene nanosheet and a manufacturing method of the same, and more particularly to a graphene nanosheet by multiple medium controlled zero-point potential modulation and a manufacturing method of the same.

2. Description of the Related Art

[0003] Most of the existing technologies use physical methods to manufacture graphene, or modify graphene. However, the functionality of the existing graphene modification is not good, the properties and quality of the graphene are not good, and the yield of the mass-produced graphene is limited. The current method adds a solvent to perform external energy treatment, such as delamination, but the properties of graphene and its derivatives cannot be further modulated and controlled by zero-point potential energy. Moreover, the prior art cannot achieve an efficacy of combining manufacturing with additional performance.

SUMMARY OF THE INVENTION

[0004] Therefore, one object of the invention is to provide a graphene nanosheet by multiple medium controlled zero-point potential modulation and a manufacturing method of the same in order to solve the above-mentioned problems of the prior art.

[0005] In order to achieve the aforementioned object, the invention provides a graphene nanosheet by multiple medium controlled zero-point potential modulation at least comprising: a target object, the target object comprises graphite or graphite derivatives; and a multiple medium surface charge

modulation substance, the multiple medium surface charge modulation substance is applied on at least one surface of the target object, providing modulation of a zeta potential of the surface of the target object, wherein a range of the zeta potential of the surface of the target object is -300 meV to +300 meV.

[0006] Preferably, the multiple medium surface charge modulation substance is a water-based liquid containing an ionic material with adjustable surface charge.

[0007] Preferably, the multiple medium surface charge modulation substance comprises a mixture of multiple medium precursor substance with an acidic water-based liquid or an alkaline water-based liquid, the multiple medium precursor substance comprises a mixture of multiple medium leading substance with a multiple medium auxiliary substance, the multiple medium leading substance is an ionic material suspended in a water-based liquid or aerosol to form an ionic material suspension solution containing multiple medium leading substance.

[0008] Preferably, a ratio of the multiple medium leading substance and the multiple medium auxiliary substance mixture ranges from 20:1 to 1:20.

[0009] Preferably, the multiple medium auxiliary substance is a water-based solvent using an organic solvent, and the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain.

[0010] Preferably, the ionic material is an ionic compound, and the ionic compound is an ionic compound containing Group IA and/or Group IIA.

[0011] Preferably, the acidic water-based liquid is a water-based solvent containing citric acid, succinic acid, tannic acid, salicylic acid, malic acid, ascorbic acid, gallic acid, hydrochloric acid, sulfuric acid, nitric acid, or acetic acid, the alkaline water-based liquid is a water-based solvent containing ammonia, sodium bicarbonate, sodium carbonate, sodium hydroxide, potassium bicarbonate, potassium carbonate, or potassium hydroxide.

[0012] Preferably, the ionic material is an ionic compound of a nanoscale material, a sub-nanoscale material, or a micro-nanoscale material.

[0013] Preferably, the multiple medium surface charge modulation substance is a water-based liquid containing a surface active material with adjustable surface charge.

[0014] Preferably, the multiple medium surface charge modulation substance comprises a mixture of surface active material in a multiple medium leading substance and a multiple medium auxiliary substance, and the multiple medium leading substance is a water-based solvent or aerosol.

[0015] Preferably, a ratio of the multiple medium leading substance and the multiple medium auxiliary substance mixture ranges from 20:1 to 1:20.

[0016] Preferably, a weight percentage concentration of the surface active material in the multiple medium leading substance and the multiple medium auxiliary substance is not higher than 30%.

[0017] Preferably, the surface active material is a surfactant, and the surfactant is a cationic surfactant, an anionic surfactant, or a neutral surfactant.

[0018] Preferably, the multiple medium surface charge modulation substance is uniformly or conformally combined on the surface of the target object.

[0019] In order to achieve the aforementioned object, the invention provides a manufacturing method for a graphene nanosheet by multiple medium controlled zero-point potential modulation, at least comprising: providing a target object, the target object comprising graphite or graphite derivatives; and manufacturing a multiple medium surface charge modulation substance, and applying the multiple medium surface charge modulation substance onto at least one surface of the target object, providing a modulation of a zeta potential of the surface of the target object, wherein a range of the zeta potential of the surface of the target object is -300 meV to +300 meV, characterized in that the multiple medium surface charge modulation substance is a water-based liquid containing a surface active material with adjustable surface charge, wherein a manufacturing step of the multiple medium surface charge modulation substance comprises mixing a surface active material in a multiple medium leading substance and a multiple medium auxiliary substance, the multiple medium leading substance is a water-based solvent or aerosol, the multiple medium auxiliary substance is a water-based solvent using an organic solvent, and the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain, wherein a mixing ratio of the multiple medium leading substance and the multiple medium auxiliary substance ranges from 20:1 to 1: 20.

[0020] Preferably, a weight percentage concentration of the surface active material in the multiple medium leading substance and the multiple medium auxiliary substance is not higher than 30%.

[0021] Preferably, another embodiment of a manufacturing step of the multiple medium leading substance comprises suspending an ionic material in a water-based liquid or aerosol to form an ionic

material suspension solution containing multiple medium leading substance, wherein a mixing ratio of the multiple medium leading substance and the multiple medium auxiliary substance ranges from 20:1 to 1: 20, the ionic material is an ionic compound, and the ionic compound is an ionic compound containing Group IA and/or Group IIA.

[0022] Preferably, a weight percentage concentration of the surface active material in the multiple medium leading substance and the multiple medium auxiliary substance is not higher than 30%.

[0023] The invention discloses a brand-new graphene manufacturing and derivative modification technology. The technology of multiple medium controlled zero-point potential modulation of the aqueous solution method of the invention enables a modified precursor to produce a special physical or chemical functional material powder, and after modification, the produced powder is functional, and the product is novel, and is capable of being used as materials and raw materials of components, capable of effectively increasing functionalities to be used in industries such as textiles, semiconductors, energy storage batteries, and catalytic chemicals. For example, the invention is capable of manufacturing mass-produced graphene materials, improved battery electrode active materials, graphene or functional graphene for adding in textiles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is an exploded view of a first embodiment of a graphene nanosheet by multiple medium controlled zero-point potential modulation of the invention showing a multiple medium surface charge modulation substance applied on a target object.

[0025] FIG. 2 is a combined view of the first embodiment of the graphene nanosheet by multiple medium controlled zero-point potential modulation of the invention showing the multiple medium surface charge modulation substance applied on the target object.

[0026] FIG. 3 is an exploded view of a second embodiment of the graphene nanosheet by multiple medium controlled zero-point potential modulation of the invention showing the multiple medium surface charge modulation substance applied on the target object.

[0027] FIG. 4 is a combined view of the second embodiment of the graphene nanosheet by multiple medium controlled zero-point potential modulation of the invention showing the multiple medium surface charge modulation substance applied on the target object.

DETAILED DESCRIPTION OF THE INVENTION

[0028] In order to understand the technical features, content and advantages of the invention and its achievable efficacies, the invention is described below in detail in conjunction with the figures, and in the form of embodiments, the figures used herein are only for a purpose of schematically supplementing the specification, and may not be true proportions and precise configurations after implementation of the invention; and therefore, relationship between the proportions and configurations of the attached figures should not be interpreted to limit the scope of the claims of the invention in actual implementation. In addition, in order to facilitate understanding, the same elements in the following embodiments are indicated by the same referenced numbers. And the size and proportions of the components shown in the drawings are for the purpose of explaining the components and their structures only and are not intending to be limiting.

[0029] Unless otherwise noted, all terms used in the whole descriptions and claims shall have their common meaning in the related field in the descriptions disclosed herein and in other special descriptions. Some terms used to describe in the present invention will be defined below or in other parts of the descriptions as an extra guidance for those skilled in the art to understand the descriptions of the present invention.

[0030] Moreover, the terms “comprising”, “including”, “having”, and “with” used in the descriptions are all open terms and have the meaning of “comprising but not limited to”.

[0031] Please refer to FIG. 1 to FIG. 2. FIG. 1 and FIG. 2 are respectively an exploded view and a combined view of a first embodiment of a graphene nanosheet by multiple medium controlled zero-point potential modulation of the invention showing a multiple medium surface charge modulation substance applied on a target object. A graphene nanosheet 10 by multiple medium controlled zero-point potential modulation of the invention comprises a target object 20 and a multiple medium surface charge modulation substance 30. The target object 20 comprises graphite or graphite derivatives, and the target object 20 is, for example, a block or a sheet. The multiple medium surface charge modulation substance 30 is combined on a surface 22 of the target object 20 to modulate a zeta potential of the surface 22 of the target object 20, and a range of the zeta potential of the surface 22 of the target object 20 is -300 meV to +300 meV. Wherein the multiple medium surface charge modulation substance 30 can be combined (applied) on the at least one surface 22 (e.g. one surface 22 or multiple surfaces 22) of the target object 20. The invention uses the two surfaces 22 of the

target object 20 as an example, but is not limited thereto. Wherein the multiple medium surface charge modulation substance 30 is, for example, uniformly or conformally combined on the surface 22 of the target object 20.

[0032] In the invention, the multiple medium surface charge modulation substance 30 is a water-based liquid containing an ionic material with adjustable surface charge, and comprises a multiple medium precursor substance 32 mixed with an acidic water-based liquid 34 (or an alkaline water-based liquid). Wherein the multiple medium precursor substance 32 comprises a multiple medium leading substance 38 mixed with a multiple medium auxiliary substance 40, and a mixing ratio of the multiple medium leading substance 38 and the multiple medium auxiliary substance 40 ranges from 20:1 to 1: 20. The multiple medium leading substance 38 is, for example, an ionic material 42 suspended in a water-based liquid 44 (or aerosol), thereby forming an ionic material suspension solution containing multiple medium leading substance. Wherein a type of the ionic material 42 can be various suspended matters or ionic substances, and its size is, for example, nanomaterial, sub-nanomaterial or micro-nanomaterial. A type of the ionic material 42 can be determined according to actual requirements, and there is no particular limitation to a specific type. For example, the ionic material 42 is an ionic compound of a nanoscale material, a sub-nanoscale material, or a micro-nanoscale material. The ionic compound is, for example, an ionic compound containing Group IA (hydrogen, lithium, sodium, potassium, rubidium, cesium, francium) and Group IIA (beryllium, magnesium, calcium, strontium, barium, radium). The multiple medium surface charge modulation substance 30 of the invention can be a structure with a definite shape to cover the target object 20, or a structure with a definite shape after being covered on the target object 20. That is, the multiple medium precursor substance 32 and the acidic water-based liquid 34 (or alkaline water-based liquid) can also have definite shapes to form the multiple medium surface charge modulation substance 30, or can also have definite shapes after forming the multiple medium surface charge modulation substance 30.

[0033] In manufacturing steps of the first embodiment of the graphene nanosheet 10 by multiple medium controlled zero-point potential modulation of the invention, the invention providing the ionic material 42, suspending the ionic material 42 in a solvent such as the water-based liquid 44 or aerosol, and for example, using an external force such as heating or stirring to uniformly disperse the ionic material 42 in a solvent such as the water-based liquid 44 or aerosol, thereby forming the multiple

medium leading substance 38, wherein the multiple medium leading substance 38 is an ionic material suspension solution containing multiple medium leading substance.

[0034] Then, the invention mixing the multiple medium leading substance 38 with the multiple medium auxiliary substance 40 in a specific ratio in order to obtain the multiple medium precursor substance 32, wherein the multiple medium leading substance 38 and the multiple medium auxiliary substance 40 are mixed in a ratio ranging from 20:1 to 1:20. Then, the invention mixing the multiple medium precursor substance 32 with the acidic water-based liquid 34 or the alkaline water-based liquid in order to obtain the multiple medium surface charge modulation substance 30, which is a water-based liquid containing an ionic material with adjustable surface charge. Afterwards, the invention is capable of applying the multiple medium surface charge modulation substance 30 on the target object 20, so that the multiple medium surface charge modulation substance 30 is combined on the surface 22 of the target object 20, thereby modulating a zeta potential of the surface 22 the target object 20. The invention is capable of further regulating and controlling properties of graphene and its derivatives through zero-point potential energy to achieve an efficacy of combining manufacturing with additional properties. Wherein an adding order of different types of solvents, such as the water-based liquid 44 (or aerosol), the multiple medium auxiliary substance 40, and the acidic water-based liquid 34 (or alkaline water-based liquid) can be interchanged, as long as the ionic material 42 can be mixed and the water-based liquid containing the ionic material with adjustable surface charge can be formed, any adding order can be applied to the invention.

[0035] One of features of the invention is that the multiple medium auxiliary substance 40 is a water-based solvent using an organic solvent, wherein the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain. The acidic water-based liquid 34 can be, for example, a water-based solvent containing citric acid, succinic acid, tannic acid, salicylic acid, malic acid, ascorbic acid, gallic acid, hydrochloric acid, sulfuric acid, nitric acid, or acetic acid. The alkaline water-based liquid can be, for example, a water-based solvent containing ammonia, sodium bicarbonate, sodium carbonate, sodium hydroxide, potassium bicarbonate, potassium carbonate, or potassium hydroxide.

[0036] The multiple medium surface charge modulation substance 30 of the invention is a mixed structure (such as solution) with a certain proportion of an ionic material with adjustable surface charge and a water-based solvent. A zeta potential formed by the surface charge of the target object

20 affects a degree of surface adjustment of the ionic material 42 entering into a raw material. A surface zeta potential -300 meV~ +300 meV of the raw material graphite or its derivatives is conducive to a degree of dispersion of the material. In the invention, the synthesized multiple medium surface charge modulation material 30 is applied to the raw material and the derivative material, and the surface can be adjusted to have different properties, such as functional groups and degree of dispersion, so it has the function of adjusting the material, which is conducive to improving properties of the material in use.

[0037] Please refer to FIG. 3 to FIG. 4. FIG. 3 and FIG. 4 are respectively an exploded view and a combined view of a second embodiment of the graphene nanosheet by multiple medium controlled zero-point potential modulation of the invention showing the multiple medium surface charge modulation substance applied on the target object. The graphene nanosheet 10 by multiple medium controlled zero-point potential modulation of the invention comprises the target object 20 and the multiple medium surface charge modulation substance 30. The target object 20 comprises carbon-containing substances such as graphite or graphite derivatives, and the target object 20 is, for example, a block or a sheet. The multiple medium surface charge modulation substance 30 is combined on the surface 22 of the target object 20 to modulate a zeta potential of the surface 22 of the target object 20, and a range of the zeta potential of the surface 22 of the target object 20 is -300 meV to +300 meV. Wherein the multiple medium surface charge modulation substance 30 can be combined on the surface 22 or the surfaces 22 of the target object 20. The invention uses the two surfaces 22 of the target object 20 as an example, but is not limited thereto.

[0038] In the invention, the multiple medium surface charge modulation substance 30 is a water-based liquid containing a surface active material with adjustable surface charge, and comprises a surface active material 50 mixed in a multiple medium leading substance 38' and the multiple medium auxiliary substance 40 in a multiple medium precursor substance 32'. The multiple medium leading substance 38' is a water-based solvent or aerosol. The multiple medium auxiliary substance 40 is a water-based solvent using an organic solvent, wherein the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain. A mixing ratio of the multiple medium leading substance 38' and the multiple medium auxiliary substance 40 ranges from 20:1 to 1:20. Wherein a weight percentage concentration of the surface active material 50 in the multiple medium leading substance 38' and the multiple medium auxiliary substance 40 is 0% to 30%, that is, not higher than

30%. The surface active material 50 is, for example, a surfactant, and can be an anionic, cationic or uncharged surfactant, which can be various surfactants according to actual needs. The surfactant is capable of adjusting and controlling a raw material surfactant due to steric barrier or charge distribution effect on a surface of the raw material, and its concentration is 0-30% by weight in the solvent.

[0039] In the invention, the multiple medium precursor substance 32' (the multiple medium surface charge modulation substance 30) is applied on the target object 20, so that the target object 20 has a function of adjusting the raw material. The target object 20 refers to carbon-containing graphite raw materials, such as graphitic carbon materials or derivatives. After mixing the multiple medium precursor material 32' with the graphitic carbon materials or derivatives, the multiple medium precursor material 32' has a function of the raw materials through zero-point potential modulation in order to increase a functionality and adjust properties of the material surface.

[0040] In a manufacturing process of the second embodiment of the graphene nanosheet 10 by multiple medium controlled zero-point potential modulation of the invention, the invention providing the surface active material 50 first, and mixing the surface active material 50 with the multiple medium leading substance 38 'and the multiple medium auxiliary substance 40, thereby forming the multiple medium precursor material 32', which is the multiple medium surface charge modulation substance 30, and is a water-based liquid containing a surface active material with adjustable surface charge, wherein the multiple medium leading substance 38' is a water-based solvent or aerosol, the multiple medium auxiliary substance 40 is a water-based solvent using an organic solvent, wherein the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain. Then, the multiple medium precursor substance 32' (i.e., the multiple medium surface charge modulation substance 30) is applied on the target object 20, so that the target object 20 has a function of adjusting the raw material.

[0041] A size, such as length, width and thickness of the multiple medium surface charge modulation substance is not particularly limited, as long as the multiple medium surface charge modulation substance can be combined on the surface of the target object, any size can be applied to the invention. Moreover, properties such as density, hardness or flexibility of the multiple medium surface charge modulation substance are not particularly limited, as long as the multiple medium surface charge modulation substance can be combined on the surface of the target object, any properties can be

applied to the invention. In the invention, the multiple medium surface charge modulation substance can be covered on the surface of the target object by, for example, spraying, smearing, coating or soaking.

[0042] The multiple medium surface charge modulation substance of the invention is not limited to a specific functional material, the multiple medium surface charge modulation substance can be any material with functionalities to be capable of exerting various functions. The invention discloses the brand-new graphene manufacturing and derivative modification technology, the technology of multiple medium controlled zero-point potential modulation of the aqueous solution method of the invention enables the modified precursor to produce a special physical or chemical functional material powder, and after modification, the produced powder is functional, and the product is novel, and is capable of being used as materials and raw materials of components, capable of effectively increasing functionalities to be used in industries such as textiles, semiconductors, energy storage batteries, and catalytic chemicals.

[0043] Note that the specification relating to the above embodiments should be construed as exemplary rather than as limitative of the present invention, with many variations and modifications being readily attainable by a person of average skill in the art without departing from the spirit or scope thereof as defined by the appended claims and their legal equivalents.

WHAT IS CLAIMED IS:

1. A graphene nanosheet by multiple medium controlled zero-point potential modulation (10) at least comprising:

a target object (20), the target object (20) comprising graphite or graphite derivatives; and

a multiple medium surface charge modulation substance (30), the multiple medium surface charge modulation substance (30) being applied on at least one surface (22) of the target object (20), providing a modulation of a zeta potential of the surface (22) of the target object (20), wherein a range of the zeta potential of the surface (22) of the target object (20) is -300 meV to +300 meV.

2. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 1, wherein the multiple medium surface charge modulation substance (30) is a water-based liquid (44) containing an ionic material (42) with adjustable surface charge.

3. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 2, wherein the multiple medium surface charge modulation substance (30) comprises a mixture of multiple medium precursor substance (32)with an acidic water-based liquid or an alkaline water-based liquid, the multiple medium precursor substance (32) comprises a mixture of multiple medium leading substance (38) with a multiple medium auxiliary substance (40), the multiple medium leading substance (38) is an ionic material (42) suspended in a water-based liquid (44) or aerosol to form an ionic material suspension solution containing the multiple medium leading substance (38).

4. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 3, wherein a ratio of the multiple medium leading substance (38) and the multiple medium auxiliary substance (40) mixture ranges from 20:1 to 1:20.

5. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 4, wherein the multiple medium auxiliary substance (40) is a water-based solvent using an organic solvent, and the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain.

6. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 3, wherein the ionic material is an ionic compound, and the ionic compound is an ionic compound containing Group IA and/or Group IIA.

7. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 3, wherein the acidic water-based liquid is a water-based solvent containing citric acid, succinic acid, tannic acid, salicylic acid, malic acid, ascorbic acid, gallic acid, hydrochloric acid, sulfuric acid, nitric acid, or acetic acid, the alkaline water-based liquid is a water-based solvent containing ammonia, sodium bicarbonate, sodium carbonate, sodium hydroxide, potassium bicarbonate, potassium carbonate, or potassium hydroxide.

8. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 3, wherein the ionic material (42) is an ionic compound of a nanoscale material, a sub-nanoscale material, or a micro-nanoscale material.

9. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 1, wherein the multiple medium surface charge modulation substance (30) is a water-based liquid (44) containing a surface active material (50) with adjustable surface charge.

10. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 9, wherein the multiple medium surface charge modulation substance (30) comprises a mixture of a surface active material (50) in a multiple medium leading substance (38) and a multiple medium auxiliary substance (40), and the multiple medium leading substance (38) is a water-based solvent or aerosol.

11. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 10, wherein a ratio of the multiple medium leading substance (38) and the multiple medium auxiliary substance (40) mixture ranges from 20:1 to 1:20.

12. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 10, wherein a weight percentage concentration of the surface active material (50) in the multiple medium leading substance (38) and the multiple medium auxiliary substance (40) is not higher than 30%.

13. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 10, wherein the surface active material (50) is a surfactant, and the surfactant is a cationic surfactant, an anionic surfactant, or a neutral surfactant.

14. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 1, wherein the multiple medium surface charge modulation substance (30) is uniformly or conformally combined on the surface (22) of the target object (20).

15. A manufacturing method for a graphene nanosheet by multiple medium controlled zero-point potential modulation, at least comprising:

providing a target object (20), the target object (20) comprising graphite or graphite derivatives; and

manufacturing a multiple medium surface charge modulation substance (30), and applying the multiple medium surface charge modulation substance (30) onto at least one surface (22) of the target object (20), providing a modulation of a zeta potential of the surface (22) of the target object (20), wherein a range of the zeta potential of the surface (22) of the target object (20) is -300 meV to +300 meV,

characterized in that

the multiple medium surface charge modulation substance (30) is a water-based liquid (44) containing a surface active material (50) with adjustable surface charge, wherein a manufacturing step of the multiple medium surface charge modulation substance (30) comprises mixing the surface active material (50) in a multiple medium leading substance (38) and a multiple medium auxiliary substance (40), the multiple medium leading substance (38) is a water-based solvent (44) or aerosol, the multiple medium auxiliary substance (40) is a water-based solvent using an organic solvent, and the organic solvent is an alcohol, a benzene, or a solvent with a carbon-containing main chain,

wherein a mixing ratio of the multiple medium leading substance (38) and the multiple medium auxiliary substance (40) ranges from 20:1 to 1:20.

16. The manufacturing method for the graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 15, wherein a weight percentage concentration of the surface active material (50) in the multiple medium leading substance (38) and the multiple medium auxiliary substance (40) is not higher than 30%.

17. The manufacturing method for the graphene nanosheet by multiple medium controlled zero-point potential modulation (10) as claimed in claim 15, wherein another embodiment of a manufacturing step of the multiple medium leading substance (38) comprises suspending an ionic material (42) in a water-based liquid or aerosol (44) to form an ionic material suspension solution containing multiple medium leading substance (38), wherein the ionic material (42) is an ionic compound, and the ionic compound is an ionic compound containing Group IA and/or Group IIA.

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ABSTRACT

GRAPHENE NANOSHEET BY MULTIPLE MEDIUM CONTROLLED ZERO-POINT POTENTIAL MODULATION AND MANUFACTURING METHOD OF THE SAME

A graphene nanosheet by multiple medium controlled zero-point potential modulation (10) and a manufacturing method of the same. The graphene nanosheet by multiple medium controlled zero-point potential modulation (10) at least comprises a target object (20) and a multiple medium surface charge modulation substance (30), the target object (20) comprises graphite or graphite derivatives, and the multiple medium surface charge modulation substance (30) is applied on a surface (22) of the target object (20), thereby a zeta potential of the surface (22) of the target object (20) is modulated. The invention is capable of adjusting functions and properties of raw materials of the target object (20) by mixing graphite and its derivatives with the multiple medium surface charge modulation substance (30) and through modulating and controlling zero-point potential energy.

Figure 1