

【CLAIMS】

【Claim 1】

A composition for detecting a target material comprising:
a graphene oxide nanocolloid (GON);
a water-soluble polymer bound to a carboxyl group moiety of a surface of the graphene oxide nanocolloid; and
a fluorescent material-conjugated probe, which is bound to a portion of the surface of the graphene oxide nanocolloid, to which the water-soluble polymer is not bound,
wherein the water-soluble polymer is any one selected from the group consisting of chitosan, a chitosan salt, dextran, hyaluronic acid, a hyaluronate, pectin, a pectin salt, an alginate, alginic acid, agar, a galactomannan, a galactomannan salt, xanthan, a xanthan salt, polyethylene glycol (PEG), polyethyleneimine (PEI) and a combination thereof.

【Claim 2】

The composition for detecting a target material of claim 1, wherein the graphene oxide nanocolloid has a particle or sheet form.

【Claim 3】

The composition for detecting a target material of claim 2, wherein the graphene oxide nanocolloid has a particle size of 0.01 to 1 μm .

【Claim 4】

The composition for detecting a target material of claim 1, wherein the conjugation is achieved by a chemical or physical bond.

【Claim 5】

The composition for detecting a target material of claim 4, wherein the chemical bond is EDC coupling.

【Claim 6】

The composition for detecting a target material of claim 4, wherein the physical bond is a hydrogen bond.

【Claim 7】

The composition for detecting a target material of claim 1, wherein the probe is any one selected from the group consisting of an antibody, a nucleic acid, a peptide, a protein and a combination thereof.

【Claim 8】

The composition for detecting a target material of claim 7, wherein the nucleic acid consists of 10 to 50 bases.

【Claim 9】

The composition for detecting a target material of claim 7, wherein the nucleic acid is any one selected from the group consisting of DNA, RNA, mRNA, miRNA, non-coding RNA, double helix RNA, double helix DNA, a DNA-based enzyme, a deoxyribozyme, an aptamer, PNA, LNA and a combination thereof.

【Claim 10】

The composition for detecting a target material of claim 7, wherein the nucleic acid is any one selected from the group consisting of SEQ ID NOs: 1 to 10.

【Claim 11】

The composition for detecting a target material of claim 1, wherein the fluorescent material is any one selected from the group consisting of fluorescein, fluorescein chlorotriazinyl, rhodamine green, rhodamine red, tetramethylrhodamine, fluorescein isothiocyanate (FITC), Oregon green, Alex Fluor, carboxyfluorescein (FAM), 6-carboxy-4',5'-dichloro-2',7'-dimethoxyfluorescein (JOE), carboxy-X-rhodamine (ROX), 6-carboxy-2',4,4',5',7,7'-hexachlorofluorescein (HEX), Texas red (sulforhodamine 101 acid chloride), 6-carboxy-2',4,7,7-tetrachlorofluorescein (TET), tetramethylrhodamine-isothiocyanate (TRITC), carboxytetramethylrhodamine (TAMRA), a cyanine-based dye, a thiodicarbocyanine dye and a combination thereof.

【Claim 12】

The composition for detecting a target material of claim 11, wherein the cyanine-based dye is any one selected from the group consisting of Cy3, Cy5, Cy5.5, Cy7 and a combination thereof.

【Claim 13】

The composition for detecting a target material of claim 1, wherein the target material is detected in a patient with a disease, and the disease is cancer, an infectious disease, an inflammatory disease, or a genetic disease.

【Claim 14】

The composition for detecting a target material of claim 13, wherein the infectious disease is caused by an infection of any one selected from the group consisting of bacteria, fungi, viruses, parasites and a combination thereof.

【Claim 15】

The composition for detecting a target material of claim 14, wherein the bacteria is any one selected from the group consisting of *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Acinetobacter baumannii* and a combination thereof.

【Claim 16】

The composition for detecting a target material of claim 14, wherein the viruses is any one selected from the group consisting of a double-stranded DNA virus, a single-stranded DNA virus, a double-stranded RNA virus, a positive-sense single-stranded RNA virus, a negative-sense single-stranded RNA virus, a single-stranded RNA retrovirus, a double-stranded DNA retrovirus and a combination thereof.

【Claim 17】

The composition for detecting a target material of claim 14, wherein the virus is any one selected from the group consisting of human cytomegalovirus, Dengue virus and a combination thereof.

【Claim 18】

A method for providing information necessary for the diagnosis of a disease, comprising:

- 1) mixing the composition for detecting a target material of claim 1 with an isolated sample;
- 2) measuring a fluorescence level of the mixture; and
- 3) comparing the resulting level with a fluorescence level of a normal control sample.

【Claim 19】

The method of claim 18, wherein the disease is cancer, an infectious disease, an inflammatory disease or a genetic disease.

【Claim 20】

A kit comprising the composition for detecting a target material of claim 1.