[CITATION REFERENCES]

[Patent Literatures]

[0006]

[Patent Literature 1] Japanese Patent Application Publication, Tokukai, No. 2004-309405 A

[Non-Patent Literatures]

[0007]

[Non-Patent Literature 1] S. Sakakihara et al., Lab Chip, 2010, 10, 3355-3362

[Non-Patent Literature 2] David M Rissin et al., Nature Biotechnology: doi: 10.1038/nbt.1641

[SUMMARY]

In one aspect, there is provided a method for sealing a substance, comprising:(i) a step of introducing a first solvent containing a substance on a substrate on which a plurality of receptacles capable of storing the substance are formed separated from each other by a side wall, wherein a region including the receptacles of the substrate is opened to the outside forming an opened well and the first solvent is introduced into the opened well via the opening of the opened well; and(ii) a step of introducing a second solvent having a greater specific gravity than that of the first solvent onto the first solvent, wherein the second solvent is introduced via the opening of the opened well so as to be layered on the first solvent in the opened well, the step (ii) being

carried out after the step (i),the second solvent layered on the first solvent moves down below the first solvent, and the first and second solvents are substituted, thereby the substance is stored in the receptacle. In another aspect, the present disclosure refers to a method for detecting a target molecule, comprising: (i) a step of reacting beads specifically capturing target molecules with the target molecules; (ii) a step of carrying out, by use of the beads, a method as disclosed herein, the step (ii) being carried out after the step (i); and (iii) a step of determining whether or not any one of beads having captured the target molecule is stored in each of the plurality of the receptacles, the step (iii) being carried out after the step (ii). In yet another aspect, there is provided A method for sealing a substance in receptacles provided on a substrate by introducing a hydrophilic solvent containing the substance into the receptacles and coating the hydrophilic solvent containing the substance introduced into the receptacles with a hydrophobic solvent, including: (i) a step of introducing a hydrophilic solvent containing the substance on a substrate on which a plurality of receptacles capable of storing the substance are formed separated from each other by a side wall, wherein a region including the receptacles of the substrate is opened to the outside forming an opened well and the hydrophilic solvent is introduced into the opened well

via the opening of the opened well; and (ii) a step of introducing a hydrophobic solvent having a greater specific gravity than that of the hydrophilic solvent onto the hydrophilic solvent, wherein the hydrophobic solvent is introduced via the opening of the opened well so as to be layered on the hydrophilic solvent in the opened well, the step (ii) being carried out after the step (i), the hydrophobic solvent layered on the hydrophilic solvent moves down below the hydrophilic solvent, and the hydrophilic and hydrophobic solvents are substituted, thereby the substance is stored in the receptacle.

[Technical Problem]

[0008]

In order to detect, e.g., disease markers of low concentration for early detection of diseases, infectious diseases, and the like, there is a demand for biosensing techniques developed to have higher sensitivities. For example, in a case where one million cancer cells included in a tumor having a volume of 1 mm^3 secrete marker proteins (100 molecules per cell) into 5-liter blood, a concentration of the proteins in the blood is approximately 30 aM. A technique capable of detecting target molecules of such quite low concentration is needed.

[0009]

CLAIMS

[Claim 1]

A method for sealing a substance, comprising:

(i) a step of introducing a first solvent containing a substance on a substrate on which a plurality of receptacles capable of storing the substance are formed separated from each other by a side wall, wherein a region including the receptacles of the substrate is opened to the outside forming an opened well and the first solvent is introduced into the opened well via the opening of the opened well; and

(ii) a step of introducing a second solvent having a greater specific gravity than that of the first solvent onto the first solvent, wherein the second solvent is introduced via the opening of the opened well so as to be layered on the first solvent in the opened well, the step (ii) being carried out after the step (i),

the second solvent layered on the first solvent moves down below the first solvent, and the first and second solvents are substituted, thereby the substance is stored in the receptacle.

[Claim 2]

The method according to claim 1, wherein at least one of the first solvent and the second solvent contains a surfactant.

[Claim 3]

The method according to claim 2, wherein the surfactant in the first solvent has a concentration of 0.01% to 1%.

[Claim 4]

The method according to any one of claims 1 to 3, wherein the second solvent is at least one selected from the group consisting of saturated hydrocarbon, unsaturated hydrocarbon, aromatic hydrocarbon, silicone oil, hexafluoropropylene epoxide polymer, a polymer having a hydrofluoroether structure, perfluoropolyether, chlorotrifluoroethylene polymer, and a polymer having a perfluorocarbon structure, or is a mixture including the at least one.

[Claim 5]

The method according to any one of claims 1 to 4, wherein the first solvent is at least one selected from the group consisting of water, hydrophilic alcohol, hydrophilic ether, ketone, nitrile solvents, dimethyl sulfoxide, and N,N-dimethylformamide, or is a mixture including the at least one.

[Claim 6]

The method according to claim 4 or 5, wherein the side wall has a hydrophobic upper surface comprising a fluorocarbon polymer resin and the second solvent is a polymer having a perfluorocarbon structure.

[Claim 7]

The method according to any one of claims 1 to 6, wherein the substance is one or more selected from beads, nucleic acid, protein, virus, cells, and lipid membrane complex.

[Claim 8]

A method for detecting a target molecule, comprising:

(i) a step of reacting beads specifically capturing target molecules with the target molecules;

(ii) a step of carrying out, by use of the beads, a method recited in any one of claims 1 to 7, the step (ii) being carried out after the step (i); and

(iii) a step of determining whether or not any one of beads having captured the target molecule is stored in each of the plurality of the receptacles, the step (iii) being carried out after the step (ii).

[Claim 9]

The method according to claim 8, wherein the beads are such beads to which molecules specifically bindable to the target molecules are bound.

[Claim 10]

A method for sealing a substance in receptacles provided on a substrate by introducing a hydrophilic solvent containing the substance into the receptacles and coating the hydrophilic solvent containing the substance introduced into the receptacles with a hydrophobic solvent, including:

(i) a step of introducing a hydrophilic solvent containing the substance on a substrate on which a plurality of receptacles capable of storing the substance are formed separated from each other by a side wall, wherein a region including the receptacles of the substrate is opened to the outside forming an opened well and the hydrophilic solvent is introduced into the opened well via the opening of the opened well; and (ii) a step of introducing a hydrophobic solvent having a greater specific gravity than that of the hydrophilic solvent onto the hydrophilic solvent, wherein the hydrophobic solvent is introduced via the opening of the opened well so as to be layered on the hydrophilic solvent in the opened well, the step (ii) being carried out after the step (i),

the hydrophobic solvent layered on the hydrophilic solvent moves down below the hydrophilic solvent, and the hydrophilic and hydrophobic solvents are substituted, thereby the substance is stored in the receptacle.