Prior Art Documents

Patent Documents

[0003]

[Patent Document 1] US 5670483 A

[Patent Document 2] WO 2007/000979 A1

Summary ~~of Invention~~

Problems to be solved ~~by the Invention~~

[0004] The present ~~invention~~disclosure has been made in order to solve the above-mentioned problem. An object of the present ~~invention~~disclosure is to provide a peptide gel with practically sufficient mechanical strength and a self-assembling peptide capable of forming the peptide gel.

Means for solving the problems

[0005] According to the present ~~invention~~disclosure, a self-assembling peptide is provided. The self-assembling peptide is formed of the following amino acid sequence:

Amino acid sequence: $a_1b_1c_1b_2a_2b_3db_4a_3b_5c_2b_6a_4$

where: a_1 to a_4 each represent a basic amino acid residue; b_1 to b_6 each represent an uncharged polar amino acid residue and/or a hydrophobic amino acid residue, provided that at least five thereof each represent a hydrophobic amino acid residue; c_1 and c_2 each represent an acidic amino acid residue; and d represents a hydrophobic amino acid residue.

In a first aspect, there is provided a self-assembling peptide, formed of the following amino acid sequence:

Amino acid sequence: $a_1b_1c_1b_2a_2b_3db_4a_3b_5c_2b_6a_4$

where: a_1 to a_4 each represent a basic amino acid residue; b_1 to b_6 each represent a hydrophobic amino acid residue; c_1 and c_2 each represent an acidic amino acid residue; and d represents a hydrophobic amino acid residue; wherein b_3 and b_4; and/or b_3 and d; and/or b_4 and d each represent a leucine residue.

In a second aspect, there is provided a modified peptide having a self-assembling ability, wherein the modified peptide comprises the self-assembling peptide as defined above whose N-terminal amino group and/or C-terminal carboxyl group are/is modified.

In a third aspect, there is provided a peptide gel, which is formed from an aqueous solution including the self-assembling peptide as defined above and/or the modified peptide as defined above.

In a fourth aspect, there is provided a substrate for cell culture, comprising at least one selected from the group consisting of the self-assembling peptide as defined above, the modified peptide as defined above, and the peptide gel as defined above.

In a fifth aspect, there is provided a manufacturing method for a sterile peptide, comprising the step of sterilizing the self-assembling peptide as defined above and/or the modified peptide as defined above under a pressurized condition at 100°C or more.

In a sixth aspect, there is provided a manufacturing method for an article coated with a peptide gel, comprising the steps of: freezing the peptide gel as defined above; melting the frozen peptide gel to provide a peptide sol; coating at least part of a surface of an article to be coated with the peptide sol; and reconstructing a peptide gel from the peptide sol.

In one embodiment of the ~~invention~~present disclosure, b_3 and b_4 in the amino acid sequence each represent a hydrophobic amino acid residue.

In another embodiment of the ~~invention~~present disclosure, all of b_1 to b_6 in the amino acid sequence each represent a hydrophobic amino acid residue.

In still another embodiment of the ~~invention~~present disclosure, b_1 to b_6 in the amino acid sequence each independently represent an alanine residue, a valine residue, a leucine residue, or an isoleucine residue.

In still another embodiment of the ~~invention~~present disclosure, d in the amino acid sequence represents an alanine residue, a valine residue, a leucine residue, or an isoleucine residue.

In still another embodiment of the ~~invention~~present disclosure, the self-assembling peptide includes a peptide formed of an amino acid sequence of RLDLRLALRLDLR (SEQ ID NO: 1), RLDLRLLLRLDLR (SEQ ID NO: 2), RADLRLALRLDLR (SEQ ID NO: 6), RLDLRLALRLDAR (SEQ ID NO: 7), RADLRLLLRLDLR (SEQ ID NO: 8), RADLRLLLRLDAR (SEQ ID NO: 9), RLDLRALLRLDLR (SEQ ID NO: 10), or RLDLRLLARLDLR (SEQ ID NO: 11).

In still another embodiment of the ~~invention~~present disclosure, the self-assembling peptide includes a peptide formed of an amino acid

sequence of RLDLRLALRLDLR (SEQ ID NO: 1) or RLDLRLLLRLDLR (SEQ ID NO: 2).

According to ~~another aspect of the invention~~the present disclosure, a modified peptide is provided. The modified peptide includes the self-assembling peptide whose N-terminal amino group and/or C-terminal carboxyl group are/is modified and has a self-assembling ability.

In one embodiment of the ~~invention~~present disclosure, the N-terminal amino group and/or the C-terminal carboxyl group have/has added thereto an amino acid sequence including RGD.

According to ~~still another aspect of the invention~~the present disclosure, a peptide gel is provided. The peptide gel is formed from an aqueous solution including the self-assembling peptide and/or the modified peptide.

In one embodiment of the ~~invention~~present disclosure, the aqueous solution further includes an additive.

In another embodiment of the ~~invention~~present disclosure, the additive includes at least one selected from the group consisting of a pH adjuster, an amino acid, a vitamin, a saccharide, a polysaccharide, an alcohol, a polyalcohol, a pigment, a bioactive substance, an enzyme, an antibody, DNA, and RNA.

In still another embodiment of the ~~invention~~present disclosure, the peptide gel has an absolute value L (g/s) of an amount of change in load per unit time of 0.03 g/s or more in an approximate straight line of values measured from the start of compression to between 8 and 10 seconds in a compression test carried out at a compression speed of 0.05 mm/s using a jig whose tip has a spherical shape with a diameter of 3.2 mm and a curvature radius of 1.6 mm under a temperature condition of 22°C.

According to ~~still another aspect of the invention~~the present disclosure, a substrate for cell culture is provided. The substrate for cell culture includes at least one selected from the group consisting of the self-assembling peptide, the modified peptide, and the peptide gel.

According to ~~still another aspect of the invention~~the present disclosure, a manufacturing method for a sterile peptide is provided. The manufacturing method for a sterile peptide includes the step of sterilizing the self-assembling peptide and/or the modified peptide under a pressurized condition at 100°C or more.

According to ~~still another aspect of the invention~~the present disclosure, a manufacturing method for an article coated with a peptide gel is provided. The manufacturing method for an article coated with a peptide gel includes the steps of: freezing the peptide gel;