without damaging dermal tissue, it is necessary that the needles or protrusions do not reach dermis.

[0014] However, as described above, some of the conventional microneedle arrays that have hollow needles penetrate into dermis because the needles are long. On the other hand, those having needles with a length reduced so as not to reach dermis or non-hollow protrusions carry a low dose of administration and therefore are unsatisfactory in terms of sustained releasability.

[0015] The present invention is then aimed to provide a microneedle array configured to carry a sufficient dose of administration without reaching dermis and with excellent sustained releasability.

Solution to Problem

[0016] In order to attain the aim, a microneedle array according to the present invention is a microneedle array that includes a plurality of hollow needles; and a plurality of individual liquid chambers in communication with the hollow needles that each are configured to hold a liquid composition to be ejected from tip end holes of the hollow needles, each of the hollow needles having a length of 1 to 100 μm, the individual liquid chambers being provided corresponding to the hollow needles.

Advantageous Effects of Invention

[0017] The present invention provides a microneedle array configured to carry a sufficient dose of administration without reaching dermis and with excellent sustained releasability.

Brief Description of Drawings

[0018] FIG. 1A is a schematic sectional view of an exemplary microneedle array according to the present embodiment.

FIG. 1B is a schematic perspective view of the exemplary microneedle array according to the present embodiment.

FIG. 2 is a schematic perspective view of an exemplary

substrate for use in production of the microneedle array of the present embodiment.

FIGS. 3A and 3B are sectional diagrams of the microneedle sheet of the present embodiment.

FIG. 4 is a schematic sectional view of an exemplary microneedle array of the present embodiment with a coating layer.

Description of Embodiments

[0019] A microneedle array and a microneedle sheet according to the present invention will be described below with reference to the figures. It should be noted that the present invention is not limited to the embodiments below and is susceptible to changes, such as other embodiments, addition, modification, and deletion, within a range that can be conceived by those skilled in the art, and any modes that achieve the operation effects of the present invention are to be encompassed in the range of the present invention.

[0020] [Microneedle Array]

FIGS. 1A and 1B are diagrams schematically illustrating a microneedle array of the present invention, in that FIG. 1A is a sectional view and FIG. 1B is a perspective view.

The microneedle array of the present invention includes a plurality of hollow needles 11 and a plurality of individual liquid chambers 12 in communication with the hollow needles 11 for holding a liquid composition to be ejected from the tip end holes of the hollow needles 11. The length of each hollow needle 11 is 1 to 200 μm, and the individual liquid chambers 12 are provided corresponding to the hollow needles 11.

[0021] The length of the hollow needle 11 is a length from the base to the tip end. If the hollow needle 11 is from 1 μm to 200 μm, when applied to skin, the hollow needle 11 can deliver a liquid composition from the tip end

particle with a hydrophobic material.

[0040] When the coating layer 13 is formed of gelatin, gelatin serves as a cover during storage to achieve the effect of preventing leakage of the liquid in the individual liquid chamber 12 (anchor effect). When applied to skin, gelatin prevents buckling of the hollow needle 11 and facilitates insertion. The gelatin at the tip end region swells and dissolves in the body, so that the liquid in the individual liquid chamber 12 can flow to the tip end of the hollow needle 11 to be supplied.

[0041] The thickness of the coating layer 13 formed on the outer wall surface of the hollow needle 11 can be changed as appropriate to the extent that can prevent leakage of the liquid in the individual liquid chamber 12 as described above and achieves a strength with which the hollow needle 11 with the coating layer 13 is not bent when touching on the skin.

The diameter of the outer periphery in a state in which the coating layer 13 is formed on the outer wall surface of the hollow needle 11 is preferably set as appropriate to the extent that achieves the effect of coating as described above and in which the coating layer 13 can be dissolved. The diameter of the outer periphery can be set, for example, but not limited to, in a range of 10 to 200 μm.

[0042] [Microneedle Sheet]

FIG. 3A and FIG. 3B are sectional schematic diagrams illustrating an exemplary microneedle sheet of the present invention having the microneedle array described above.

[0043] The microneedle sheet of the present embodiment includes a microneedle array 10 and a liquid composition containing a functional ingredient of interest held in the