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Roy et al.

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(54) **MICRONEEDLE ARRAY MODULE AND METHOD OF FABRICATING THE SAME**

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(52) **U.S. Cl.** **438/48**; 438/48; 216/49; 216/2; 216/11; 216/41; 216/51; 216/56; 216/66

(58) **Field of Classification Search** 438/48; 216/49, 2, 11, 41, 51, 56, 66, 79, 99
See application file for complete search history.

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(57) **ABSTRACT**

A microneedle array module is disclosed comprising a multiplicity of microneedles affixed to and protruding outwardly from a front surface of a substrate to form the array, each microneedle of the array having a hollow section which extends through its center to an opening in the tip thereof. A method of fabricating the microneedle array module is also disclosed comprising the steps of: providing etch resistant mask layers to one and another opposite surfaces of a substrate to predetermined thicknesses; patterning the etch resistant mask layer of the one surface for outer dimensions of the microneedles of the array; patterning the etch resistant mask layer of the other surface for inner dimensions of the microneedles of the array; etching unmasked portions of the substrate from one and the other surfaces to first and second predetermined depths, respectively; and removing the mask layers from the one and the other surfaces. One embodiment of the method includes the steps of: providing an etch resistant mask layer to the other surface of the substrate to a predetermined thickness; patterning the etch resistant mask layer of the other surface to define a reservoir region in the substrate; and etching away the unmasked reservoir region of the substrate to form a reservoir well in the other surface of the substrate. A layer of material may be provided to the other surface to enclose the reservoir well and a passageway is provided through the layer to the well region.

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20 Claims, 5 Drawing Sheets

