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(54) **MICRONEEDLE DEVICES AND METHODS OF DRUG DELIVERY OR FLUID WITHDRAWAL**

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(75) Inventors: **Jeong Woo Lee, Atlanta, GA (US); Mark R. Prausnitz, Atlanta, GA (US)**

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Correspondence Address:
SUTHERLAND ASBILL & BRENNAN LLP
999 PEACHTREE STREET, N.E.
ATLANTA, GA 30309 (US)

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(52) **U.S. Cl.** **604/506; 604/272; 264/101**

(73) Assignee: **Georgia Tech Research Corporation, Atlanta, GA (US)**

(57) **ABSTRACT**

(21) Appl. No.: **12/357,195**

Microneedle devices and methods of manufacture and use thereof are provided. The devices may be used in controlled delivery of drug across or into a biological barrier, such as skin, or fluid withdrawal from a biological barrier. In one case, the device includes a base substrate which comprises a drug dispersed in a swellable matrix material; and one or more microneedles extending from the base substrate, wherein the one or more microneedles comprise a water-soluble or water-swellaable material, wherein the one or more microneedles will dissolve or swell following insertion into the biological barrier, providing a transport pathway for the drug to pass from the base substrate into the biological barrier.

(22) Filed: **Jan. 21, 2009**

Related U.S. Application Data

(63) Continuation-in-part of application No. PCT/US07/74123, filed on Jul. 23, 2007.

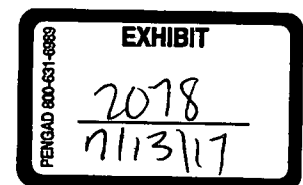
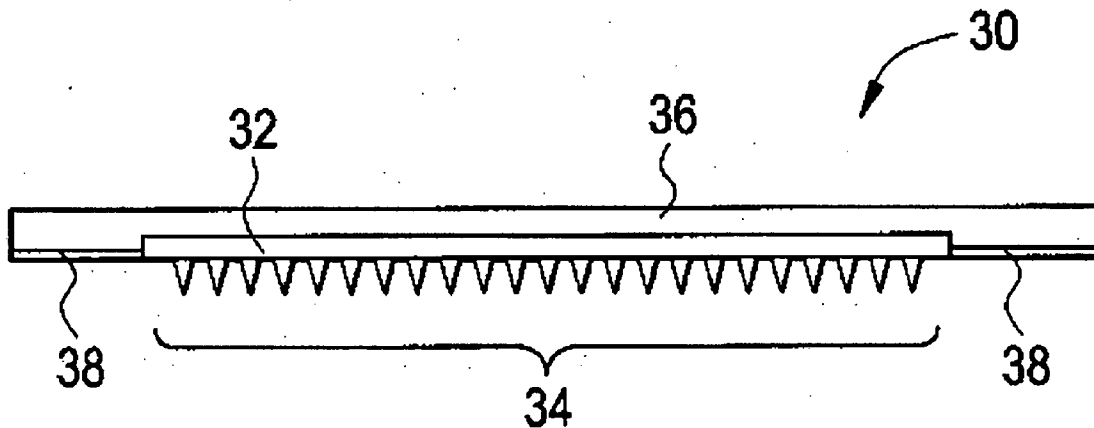


FIG. 1

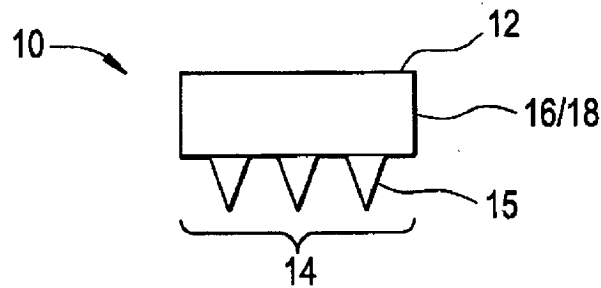


FIG. 2

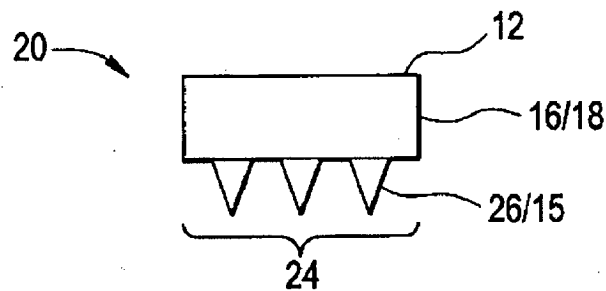


FIG. 3

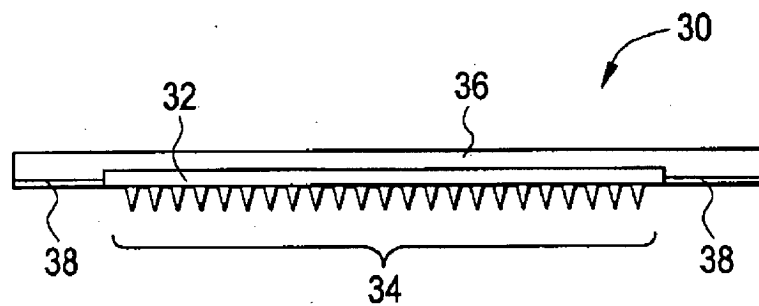


FIG. 4A

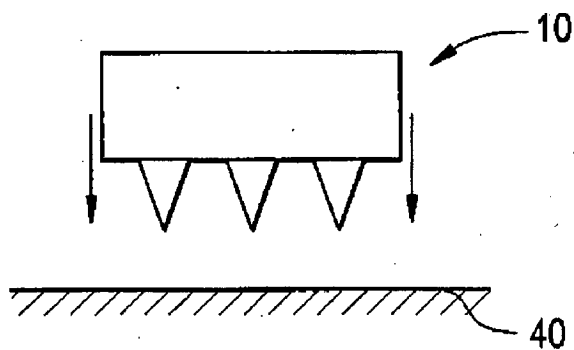


FIG. 4B

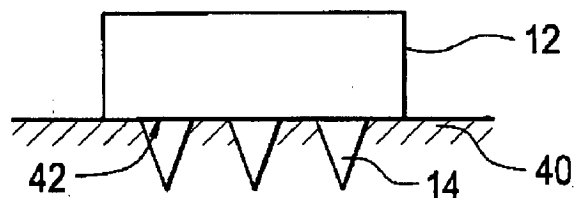


FIG. 4C

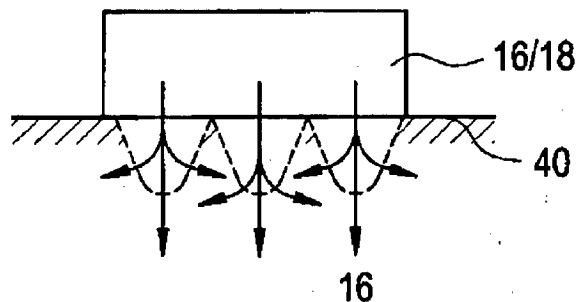


FIG. 5A

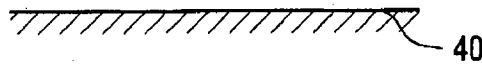
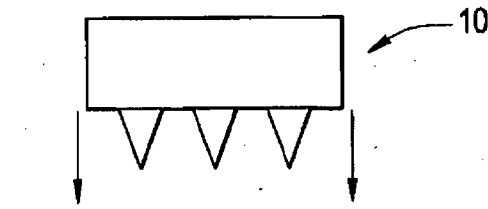


FIG. 5B

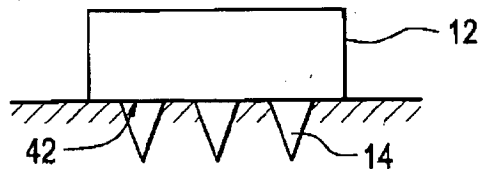


FIG. 5C

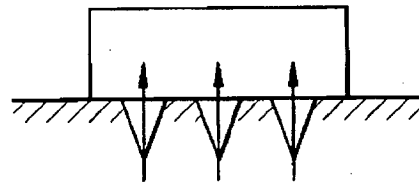


FIG. 5D

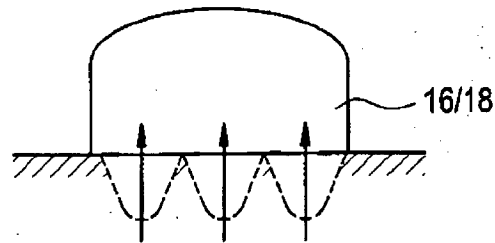


FIG. 5E

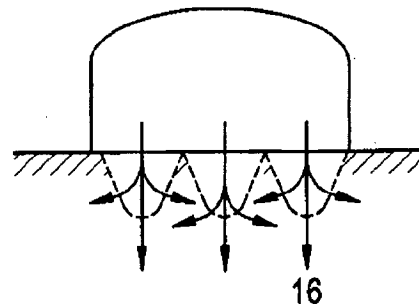


FIG. 6D

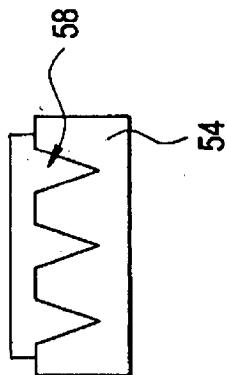


FIG. 6C

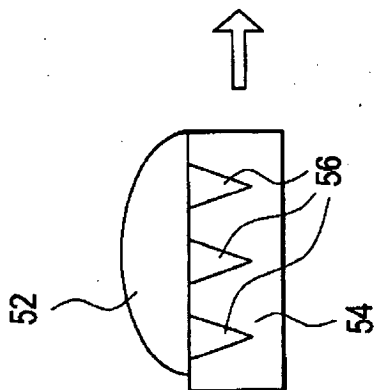


FIG. 6B

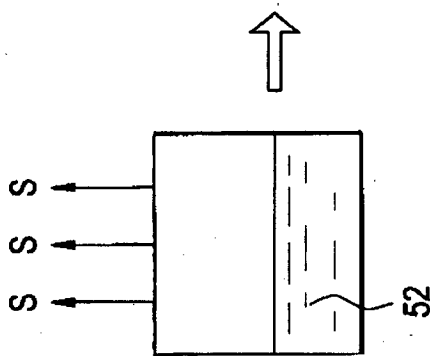


FIG. 6A

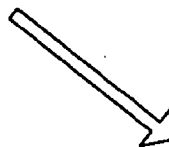
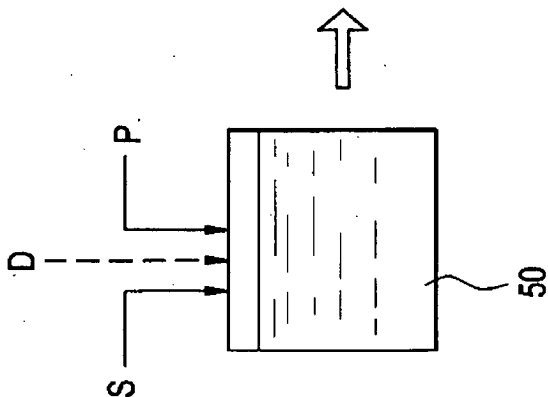
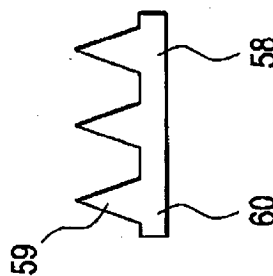


FIG. 6E



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