IIT MADRAS
Indian Institute of Technology Madras

Technology Transfer Office
TTO – IPM Cell

Industrial Consultancy & Sponsored Research (IC&SR)

MICRONEEDLE ARRAY DEVICE AND METHOD THEREOF

IITM Technology Available for Licensing

PROBLEM STATEMENT

- **Microneedle array devices (MA)** are devices that can be **configured to perform fluid delivery** or **extraction to or from a user's skin**.
- These devices can be configured to **inject medication or perform fluid sampling**, depending on the coupling of at least one microneedle with the user's skin.
- The **MA may have a control system** that interacts with extracted fluid sampling to detect user conditions, such as **diabetic conditions**.
- In cases of varying physiological conditions, users may manually measure and **calibrate the MA to control variations.**
- However, **manual calibration can be painful and time-consuming,**
- Necessitating **a device that performs fluid extraction or injection** with **minimal calibration** and the disclosure **aims to overcome any limitations** mentioned above.

TECHNOLOGY CATEGORY/ MARKET

Technology: Microneedle device with calibration mode
Category: Assistive, Test Equipment & Design Manufacturing
Industry: Biomedical
Application: Calibration of microneedle
Market: The global market size of was **USD 47,040 million in 2021** and market is **touch USD 105480.6 million by 2031** at **CAGR 8.3%** during the forecast period.

INTELLECTUAL PROPERTY

IITM IDF Ref. 2597 ,Patent No: IN 540518

TRL (Technology Readiness Level)

TRL- 3, Experimental proof of concept;

Research Lab

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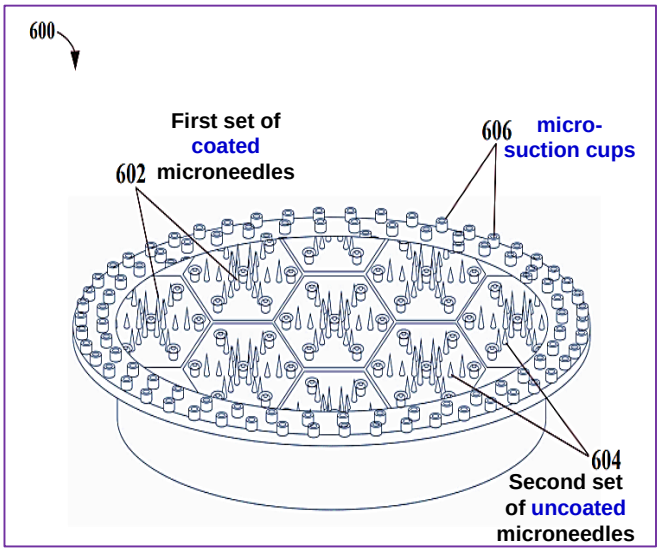
TECHNOLOGY

Microneedle Array Device



Method for manufacturing -Microneedle Array Device

1. Form first set of coated microneedles in first pattern

2.Form second set of uncoated microneedles in second pattern, where second pattern is substantially different from first pattern

3a.Couple calibration module with second set of uncoated microneedles, where the calibration module includes optical sensor, calibration module configured to

3b.calibrate first signal received from first set of coated microneedles, based on second signal received from second set of uncoated microneedles

- **A number of the second set of micro-needles are 1/10th of a number of the first set of micro-needles**

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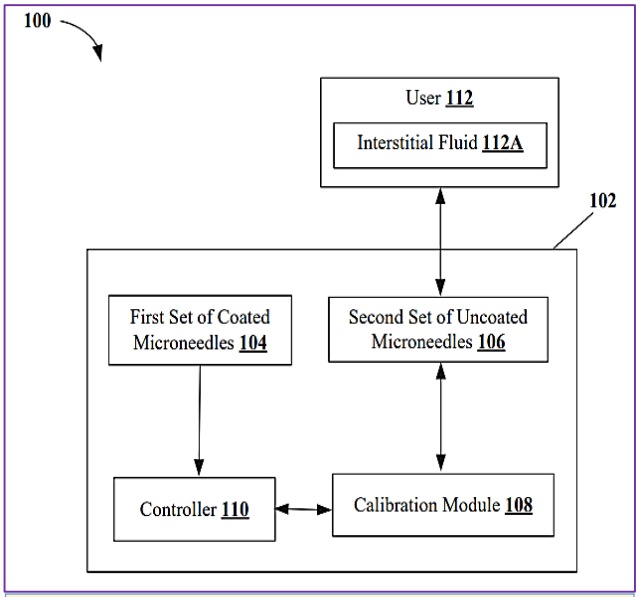
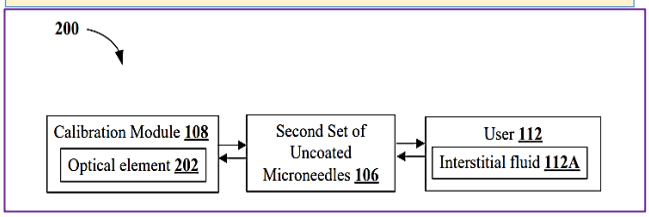
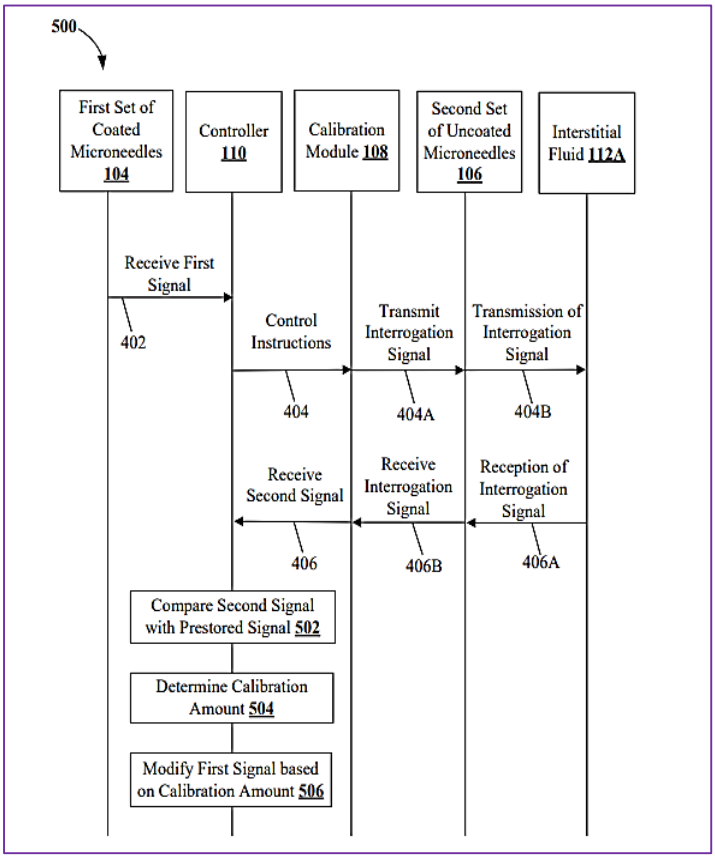
Block diagram of an exemplary environment of a microneedle array device



Block diagram of an exemplary scenario to calibrate the microneedle array device



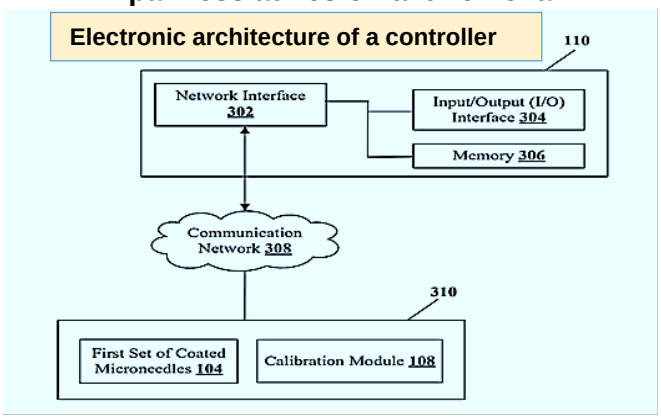
Process flow diagram to calibrate the microneedle array device



Key Features / Value Proposition

- **Increased lifetime:**
  - The device includes a set of coated microneedles that can be coated with **pyrolytic carbon material** to improve its **lifetime and disposal.**
- **Calibration-free:**
  - The device includes a second set of **uncoated microneedles coupled** with a calibration module, **eliminating the need for manual calibration**.
- **Reduced false-positive measurement:**
  - The device includes **multiple microneedles disposed at different heights,** ensuring a **wider range of measurements from different user data points.**
- **Painless adhesion and removal:**
  - The device includes **micro-suction cups** that form a **negative pressure** when contacted with **user skin, facilitating painless adhesion** and **removal.**

Electronic architecture of a controller



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