

SKIN-LIKE WEARABLE SENSORS

A new technology for fabricating electronic skin (e-skin) materials, including electrically conductive, mechanically elastic nano-patches and multi modal sensors. This disruptive technology has the potential to lead to innovative wearable products.

- **Ultrathin products (ten times thinner than a human hair)**
- **Skin-attachable and attachable to any surface**
- **Stretchable up to 300% strain**
- **Stable and durable after 60,000 cycles**
- **Low-cost manufacturing**

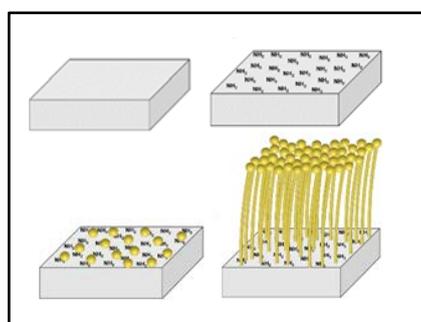


Figure 1: Simplified four step process for growing gold nanowires.

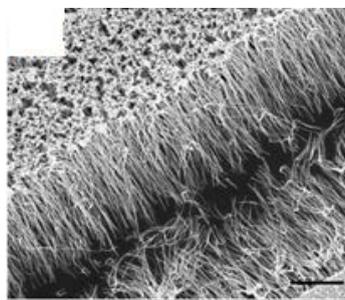


Figure 2: SEM image of gold nano-wire forest.

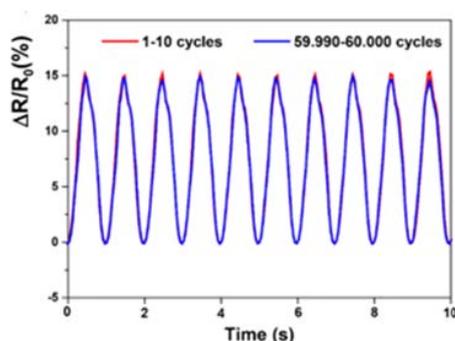


Figure 3: Evidence of maintenance of conductivity and relative resistivity at up to 60,000 cycles.

THE CHALLENGE

Current wearable sensors have several limitations:

Design issues and wearer discomfort:

The current-generation 'wearable' sensors are mainly limited to gadgets such as wrist bands, watches, glasses and earrings. These rigid devices restrict positioning of sensors and the time over which they can obtain readings.

Lack of useful information: Current wearable sensors are dominated by accelerometers, which provide limited information on movement. More useful information, such as skin or muscle stretching/deformation, cannot be provided by existing wearables.

Poor sensing accuracy: The human body is soft but current wearable sensors are rigid; conformal contact therefore cannot be established between them because of the mechanical mismatches in Young's moduli. Rigid sensors can also dislocate from soft body surfaces when people move, leading to inaccurate data. If the accuracy of vital information is uncertain, it cannot be used as baseline data for medical activity.

Bulkiness: Current designs can be quite bulky so the wearer is always conscious of the device. Low profile sensors boost the wearability of the device and add to ergonomics of potential applications.

THE TECHNOLOGY

This new e-skin technology offers important advantages over existing sensors:

- Thin, soft, e-skin nano-patches (stretchable to at least 300% strain without losing conductivity) have the potential to form the basis of comfortable, truly wearable products.
- These materials can accurately measure skin/muscle deformation.
- The soft and elastic nature of these materials allows for attachment to any part of the human body with conformal contact, ensuring reliable signals and accuracy.
- Multi-modal: can be used in designs of multiple sensor types including pressure, strain, temperature and glucose sensing.

The potential applications of this technology include behaviour tracking, sporting activity tracking, health and fitness monitoring, cardiac monitoring and tracking of sitting and sleeping.

Intellectual property: The Monash e-skin technology invention is protected by patent applications including WO2018201181.

THE OPPORTUNITY

We seek a partner to license and co-develop this technology.

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