

Scientists Invent 'Hair-Shaped' Brain-Monitoring Technology — Monitor Your Brain Without You Knowing

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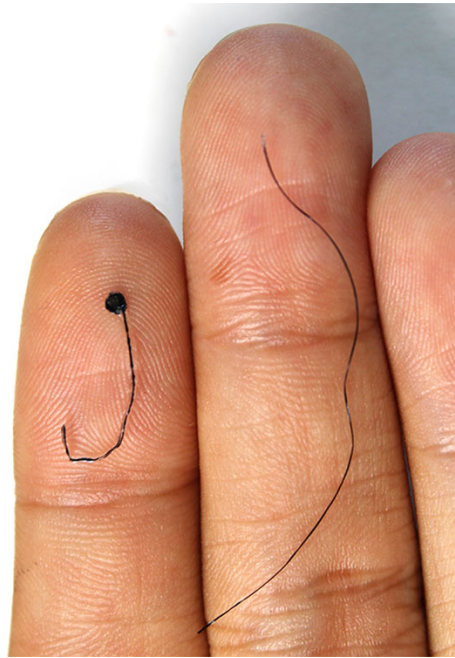
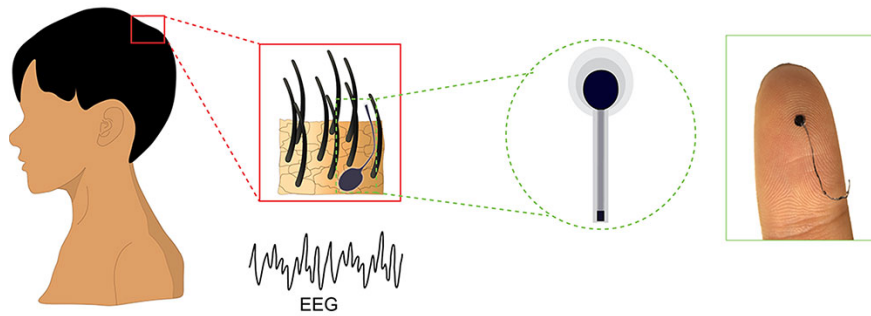
Scientists from Penn State University (USA) have successfully developed a new method to monitor brain activity using hair-shaped EEG electrodes. Instead of using traditional bulky metal electrodes, wires and sticky gels, this lightweight, flexible device adheres directly to the scalp, making long-term monitoring easier and more comfortable.

Medical applications

EEG is an essential tool for diagnosing epilepsy, sleep disorders, and brain injuries. However, standard EEG systems are often uncomfortable to wear for long periods of time due to their large size and sticky gel. Researchers at Penn State have created electrodes that can be attached directly to the scalp without skin preparation or gel, thanks to a design that mimics the structure of hair.

In a study published in *NPC Biomedical Innovations*, the 'stick-and-play' electrode provided high-quality EEG readings for more than 24 hours without signal degradation. The device also maintained its grip and stable performance after 100 cycles of movement, and was virtually invisible thanks to its human hair-like design.

Traditional metal electrodes using electrolyte gel often have problems such as gel drying, signal interference due to hair or movement. The new hair electrode effectively overcomes these disadvantages thanks to its flexible material and strong bio-adhesive, ensuring stable contact even when the user moves.



' This device enables more consistent and reliable EEG signal monitoring, while being unnoticeable when worn — improving both functionality and patient experience, ' said study lead author Professor Tao Zhou.

Beyond medicine, this technology can be applied in user health monitoring devices, allowing research on brain activity in real-world environments without affecting daily life. With the advantages of being compact, comfortable and highly durable, hair electrodes promise to revolutionize the field of neuromonitoring.

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