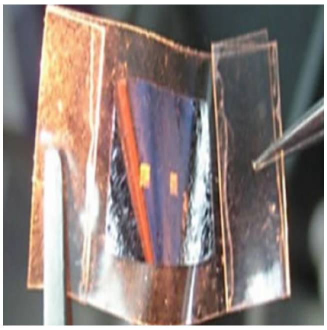
Flexible Nanosensors Adhere to Skin To Measure Vital Signs



Flexible nanosensors which can adhere to biological surfaces such as human skin will improve the use of wearable devices that measure breath, heart pressure and temperature. The low-cost technology developed by researchers at the Universidad Politécnica de Madrid (UPM) Institute of Optoelectronics Systems and Microtechnology (ISOM) uses standard polycarbonate disks, adhesive tape and aluminum, which is 25,000 times cheaper than gold.

Professor Carlos Angulos Barrios and PhD student Victor Canalejas Tejero led the study, working with other researchers from ISOM's Semiconductor Devices Group. Together, they developed a manufacturing method for the optical nanosensors that relies on inexpensive materials. First, sensors are manufactured over a polycarbonate compact disc, which provides adherence to aluminum. The sensors, each measuring one square millimetre, are then transferred to adhesive Scotch tape, which provides a flexible substrate.

The Affordability of Aluminum

Noble metals such as gold are often used in the construction of nanosensors due to their excellent electrical conduction properties. However, mass production is limited by the high cost of obtaining such materials. Because the new technology utilises widely available materials such as aluminum films, it represents an affordable solution to the more widespread production of effective nanosensors.

In addition to the aluminum film, the other materials used in the construction of the flexible optical nanosensors are also inexpensive and readily available. Compact discs and Scotch adhesive tape lend necessary strength and flexibility, without negatively impacting manufacturing costs.

Applications: Smart Labels and Wearable Devices

Nanosensors comprise nanohole arrays (250 nm) that are drilled into a 100 nm thick layer of aluminum. The structures confine and then disperse light, causing iridescence effects. The display of iridescent colour that varies according to the angles of illumination and viewing makes it possible to detect variations in position and surface topography. The flexible nanosensors allow engineers to measure differences in the refractive index of the surrounding medium, so that chemical substances can be detected.

Possible applications for the new technology include wearable devices and smart labels.

The findings have been published in the journal *Nanoscale*.

Source: [Universidad Politécnica de Madrid](#)

Image Credit: Universidad Politécnica de Madrid

Published on : Thu, 26 Feb 2015

© For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.