

IISc designs paper-based sensor for healthcare wearables

22 September 2022 | News

The future applications of this sensor can be beneficial for the healthcare sector



Several industrial, automotive, and healthcare applications rely on accurate and precise measurement of pressure. Flexible and wearable pressure sensors are typically fabricated using petroleum-based polymers. The solid waste generated from using such non-biodegradable plastics is harmful for the environment. To avoid this issue, researchers at the Indian Institute of Science (IISc), Bengaluru have now fabricated pressure sensors that use paper as the medium.

Nowadays, paper-based electronic devices are gaining greater attention owing to their natural biodegradability, excellent flexibility, porous fibrous structure, light weight, and low cost. However, paper-based sensors developed so far have certain disadvantages.

The sensor by IISc is made of plain and corrugated cellulose papers coated with tin-monosulfide (SnS) stacked alternatively to form a multi-layered architecture. SnS is a semiconductor that conducts electricity under specific conditions. "Paper in itself is an insulator. The major challenge was choosing an appropriate 3D device structure and material to give conductive properties to paper," said the researchers.

When pressure is applied on the sensor's surface, the air gaps between the paper layers decrease, increasing the contact area between these layers. Higher contact area leads to better electrical conductivity. On releasing the pressure, the air gaps increase again, thus decreasing the electrical conduction. This modulation of the electrical conductivity drives the sensing mechanism of the paper sensor. The sensor shows promise in being developed into a flexible and wearable electronic device, especially in the healthcare sector.