

Paper-based temperature sensor with high sensitivity

The CSIC has developed a thermo-resistive sensor comprising a semiconductor material onto a paper substrate. The use of this type of materials together with deposition technique of semiconductor element allow to design a thermo-resistive sensor with high sensitivity to abrupt temperature changes being up to an order of magnitude more sensitive than analogous sensors based on graphite. The use of paper as substrate makes this sensor cheap, easy to produce and biodegradable. The incorporation of this device in fabrics allows to monitor body temperature. Likewise, when integrated in packaging, it allows to record thermal history of goods.

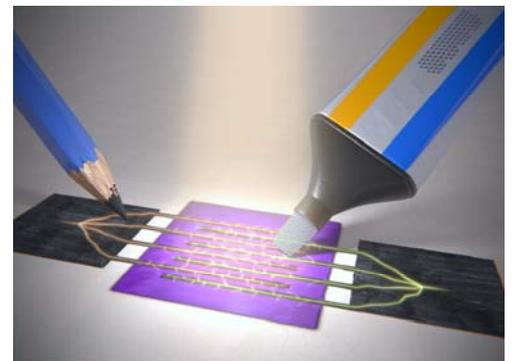
Industrial partners from the electronic components and sensors sectors or companies from textile and paper industry are being sought to collaborate through a patent licence agreement.

An offer for Patent Licensing

A sensor with relevant role for the environment

Last years, the field of paper-based electronics has been growing due to the increasing demand of low cost components with low environmental impact.

Thermo-resistive sensors developed by CSIC comprise several channels of layered semiconductor material deposited onto a conventional printing paper substrate. These channels are joined through electrodes made of a conductor material. The electrodes are connected to a device to measure the electric resistance. When compared the performance of these new sensors to that of analogous sensors based on graphite the results are very promising. The Temperature Coefficient of Resistance (TCR) was measured. TCR gives a measure of the sensitivity of thermo-resistive sensors to temperature. TCR of new sensors is between 20.000 ppm/°C and -160.000 ppm/°C while for graphite analogous sensors the value is between -2.500 ppm/°C and -3.700 ppm/°C demonstrating the improved sensitivity of the former.



These sensors are easy to produce in a maximum of 3 steps

Main innovations and advantages

- These sensors are easy to produce, cheap and biodegradable.
- They exhibit higher sensitivity than analogous sensors based on graphite or carbon nanotube wires, and even higher than sensors based on metals such as platinum, copper or nickel.
- The response of these sensors to abrupt changes of temperature is almost immediate (0.2 sec approximately). Likewise, recovery time is 1 sec.
- They have been successfully used as a respiration monitor device. They can also be used to monitor body temperature by integrating them in fabrics or textiles. Likewise, when incorporated into packaging, thermal history of goods during transport can be monitored to grant the adequate conservation of products.

Patent Status

Priority patent application filed suitable for international extension

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