Pressure sensor based on bio-sourced ionogel*

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Description

Pressure sensors are widely used but often made from non-renewable or harmful materials. Environmental concerns drive the need for eco-friendly alternatives. At the request of the Centre suisse d'électronique et de microtechnique (CSEM), this project explored using Ionogels for pressure sensors. Ionogels are hybrid materials containing an ionic liquid in a polymer matrix, offering a wide range of properties. A composition of PVA, choline lactate, and tannic acid was explored to develop environmentally friendly sensors. A bio-based sensor matrix was also designed to map pressure distribution, demonstrating a practical application.

Figure 1 Ionogel pressure sensors

Progress

Sensor

- Selection of sensor materials and design
- Composition of ionogels and temperature influence
- Optimization of the manufacturing process
- Stabilization of ionogels
- Implementation of a measurement method and sensor characterization

Sensor Matrix

- Selection of materials
- Design and conception of electrodes
- Design of a support and protection frame for sensors, electrode characterization
- Implementation of an electrode characterization method

Results and discussion

The sensors were subjected to compression tests using a specially designed test bench. The results, presented in Figure 2, show that the sensor is capable of distinguishing between the masses used, as confirmed by the statistical analysis, thus validating its functionality.

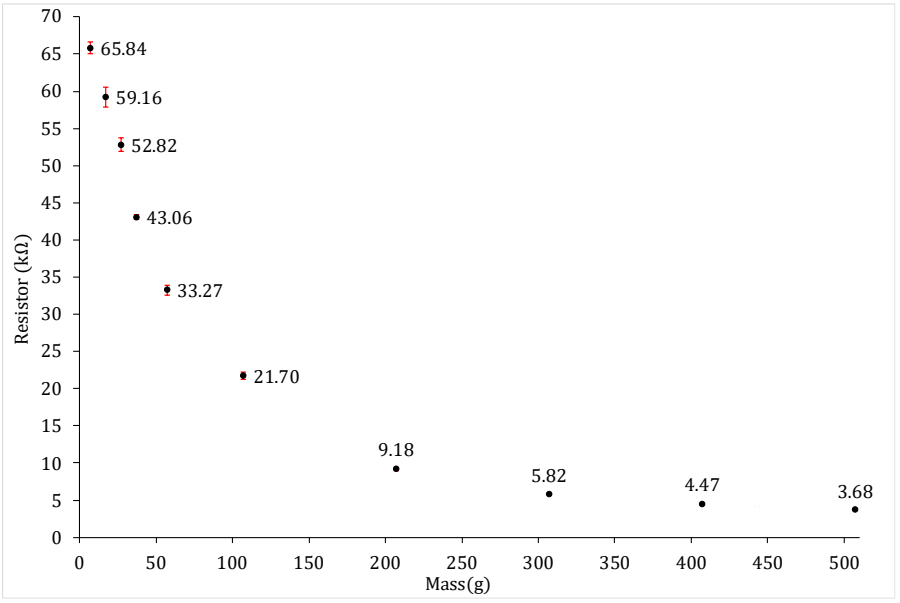

Figure 2 Average sensor resistance relative to mass

The matrix consists of sensors, a PLA support frame, and a conductive ink electrode deposited on cellulose. Figure 3 illustrates the assembly steps of this matrix.

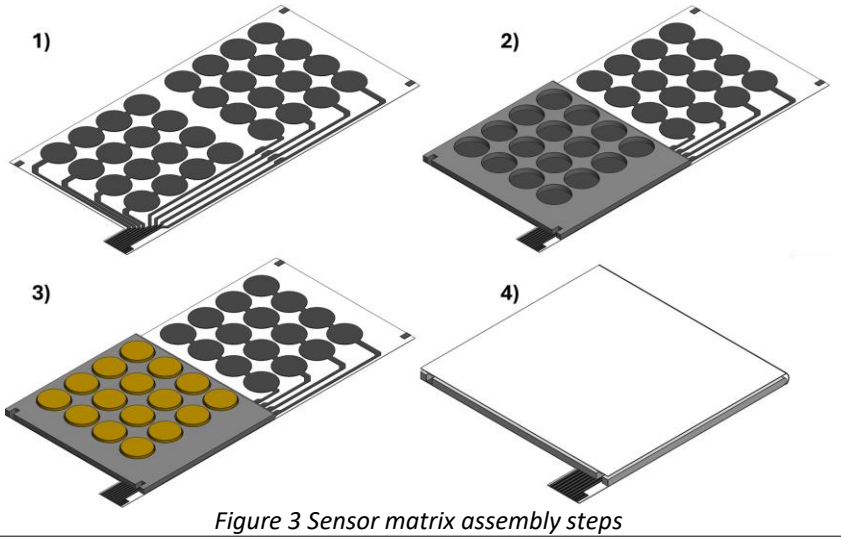

Figure 3 Sensor matrix assembly steps

Conclusions and prospects

In conclusion, the sensor is functional, but its composition may need to be revised to facilitate handling during manufacturing. It is also possible that the design of the matrix electrodes will be adjusted in the future to reduce losses. Additionally, the sensor matrix still needs to be characterized.

*Titre complet du rapport (écrit en français) : Capteur de pression à base d'Ionogel biosourcé