

# Detection of TCA in the cork stopper industry using digital olfaction technology

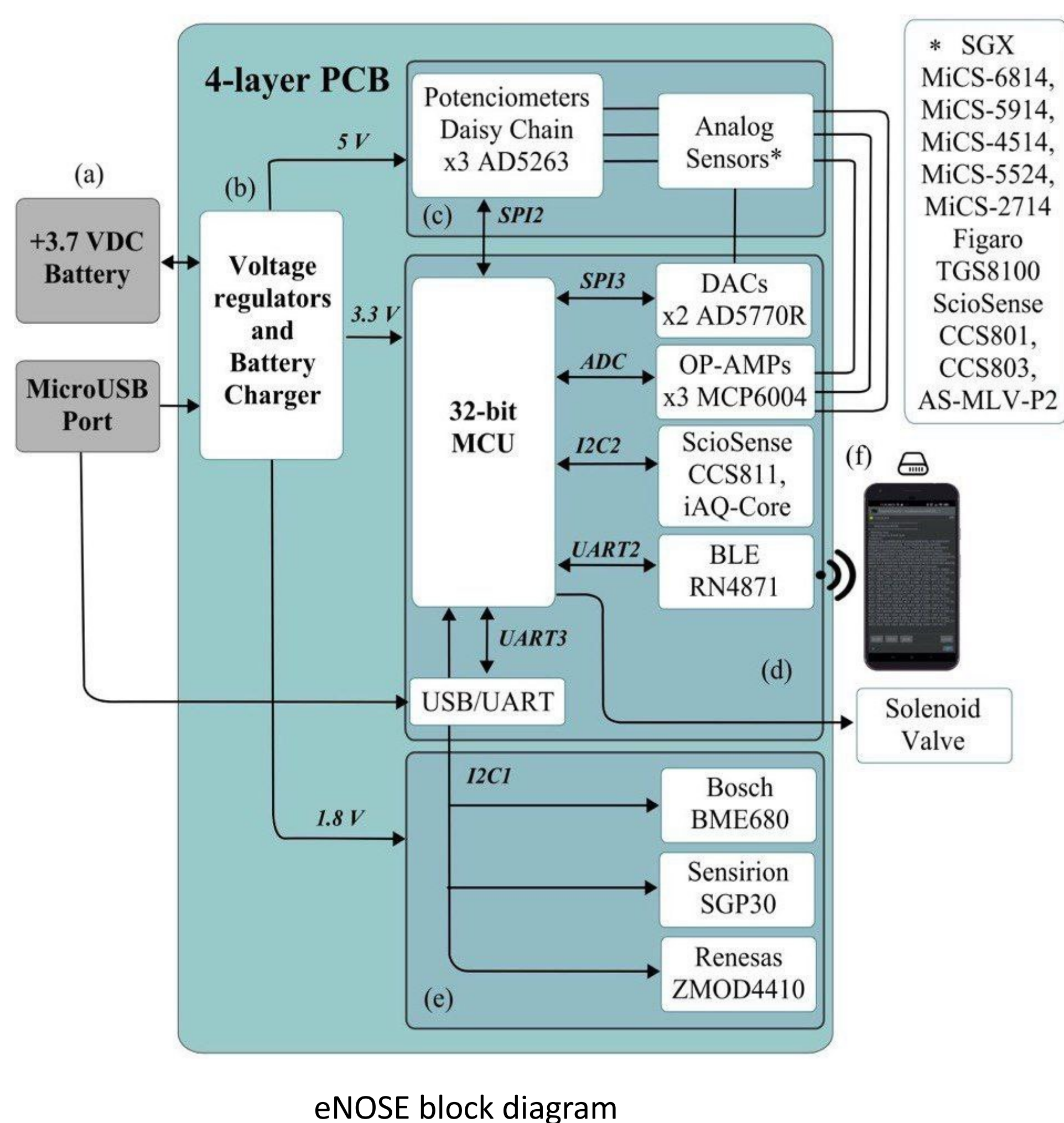
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## SUMMARY

Cork is one of the most widely used materials in the world of wine, as it is the material per excellence used to make the stoppers of wine bottles. For this reason, it is important that this material does not present defects that could spoil the wine. One of the most common defects is the presence of 2,4,6-trichloroanisole, or TCA, a gas produced in nature by some bacteria and which is responsible for the musty smell of cork. The presence of this gas produces organoleptic defects in the wine that spoil the product, with the consequent loss for customers and producers. This work proposes the use Digital Olfaction technology for the detection of TCA in cork samples as an alternative to the use of other chemical analysis techniques, such as gas chromatography, mainly used in the cork industry. Several experiments have been performed for evaluating this technology: the first one consisted of detecting small concentrations of TCA in a gas flow by using TCA permeation tubes (KIN-TEK Analytical, Inc.) to produce a constant TCA concentration. In the second and third experiments samples from three different layers of tree bark and different cork stoppers with different TCA concentrations were measured and differentiated. In the last experiment, granulated cork samples were measured at 6 different TCA concentrations (between 4 and 15.1 ng/L). The good results obtained indicated that the electronic nose can be a good alternative for the detection of TCA.

## DEVICE OVERVIEW & SAMPLES



eNOSE device

Main features:

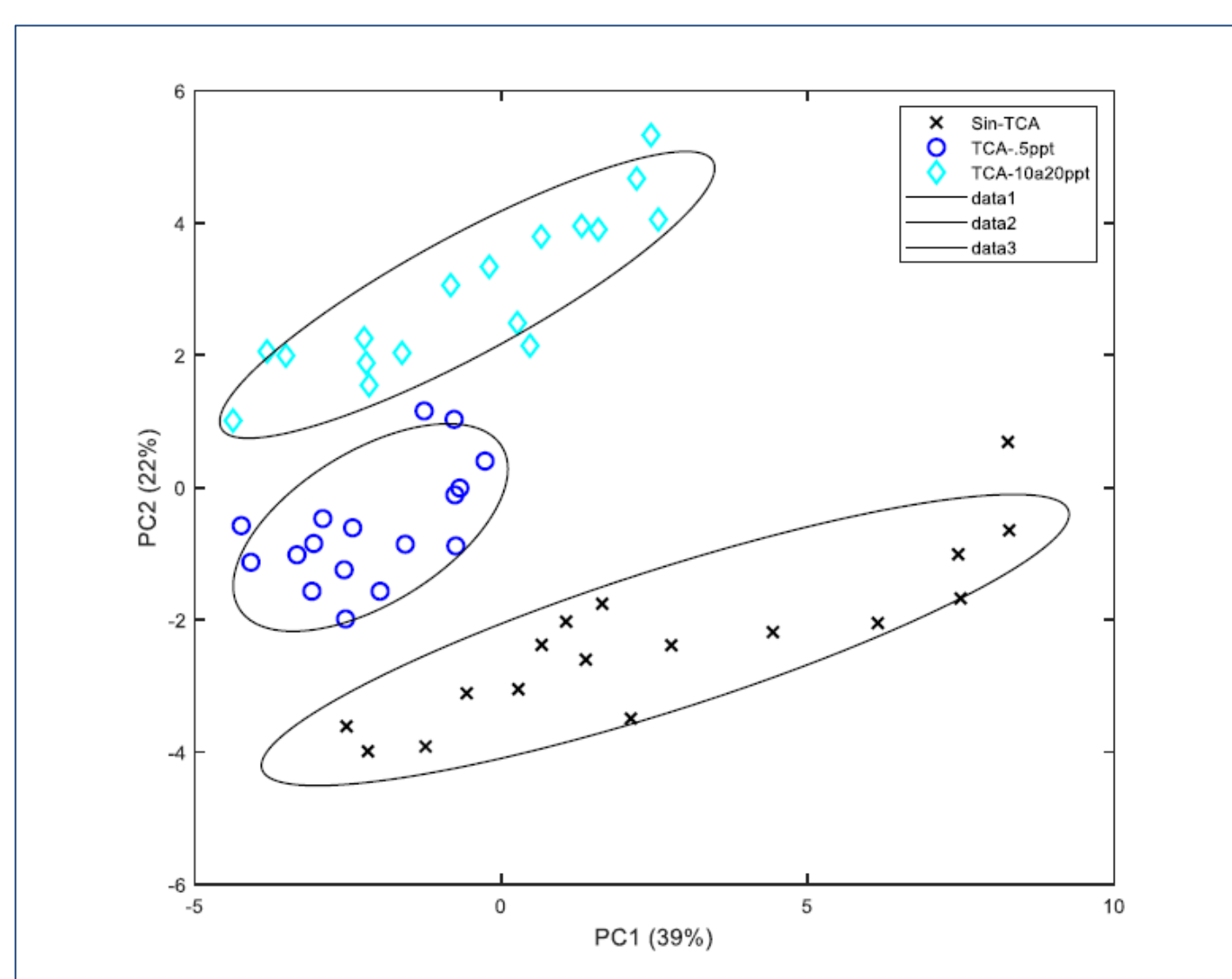
- Microcontroller: PIC32MM0256GPM064 from Microchip.
- Communications: Bluetooth and UART. ASCII-based protocol.
- Sensors: Six digital MOX sensors and nine analog MOX sensors.
- Hermetic gas cell, with a pump and a solenoid valve to choose automatically between two gas inputs.
- +5 VDC Power Supply.



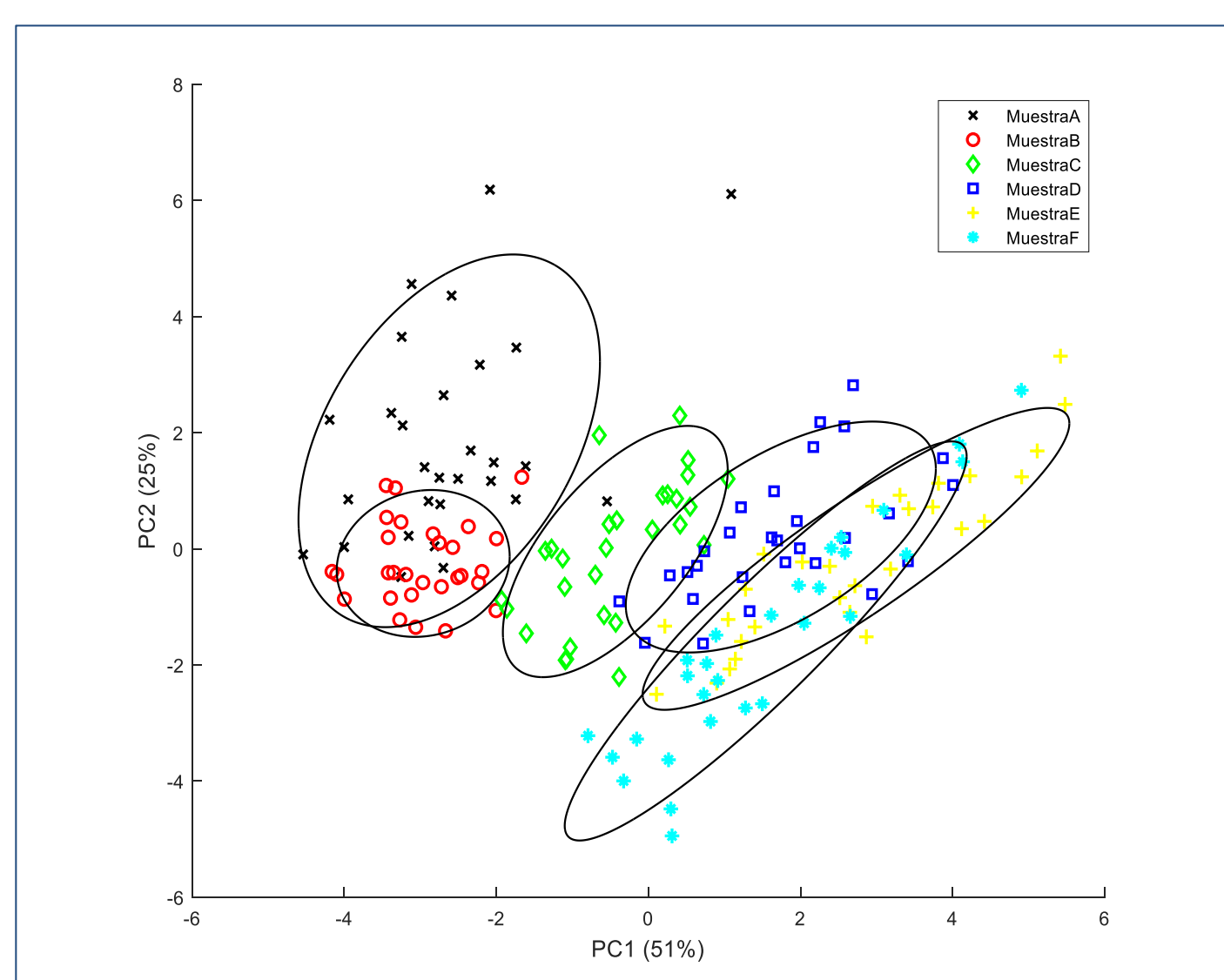
Samples: Cork stoppers (left); granulated cork (right)

## RESULTS

Cork stoppers PCA



Granulated cork PCA



## CONCLUSIONS

The electronic nose can differentiate between the three different cork stoppers. The device cannot distinguish between the 6 granulated cork samples, although it does separate the samples with the greatest difference in concentrations.

In view of these results, it can be stated that the electronic nose can be a good alternative for the detection of TCA in the cork industry. However, further tests in different environments are still to be carried out before the devices can be used in an industrial context.

## ACKNOWLEDGEMENTS

This work has been supported by grant GR21045 and IB18049 project, which is co-funded by FEDER and Junta de Extremadura.