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Monitoring of volatiles released during ripening apple with and without edible film by electronic nose

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Abstract – In this work, the influence of edible coatings based on zein in the preventing gas exchange of the fruits was investigated by electronic nose (e-nose). The gas sensors, using paper as substrate, were developed by the line-patterning technique and polyaniline thin films were obtained by "in situ" deposition in the emeraldine oxidation state. The results obtained showed that low cost e-nose can be used to observe the different response of fruit with and without edible films.

The fruit ripeness during the post-harvest is a major concern in the food industry. For the preservation of fruits in this period zein edible films can be used as a barrier, preventing gas exchange of the fruit, thus increasing its lifetime [1]. An alternative would be the detection of volatile organic compounds (VOC) during fruit ripening, using low cost e-nose, which are based in gas sensors with conducting polymer as active layer. Determining ripeness of fruit is usually performed with expensive methods. The electrical resistance of these sensors changes due to the chemical interaction of gases released during the ripening with conducting polymer.

Sensor based on thin film PANI emeraldine salt was prepared by in-situ polymerization, according to Steffens *et al*. [2]. A low-cost electronic nose (electronic system, low-cost gas sensor, 4.5 L chamber and computer) was used to detect the VOC emitted during the apple ripeness. It was evaluated the effect of an edible film based on zein (maize storage protein) on the time of ripening. Apples were compared with and without the edible film. The measurements were recorded during 45 hours, and the data were collected every 10 minutes, as well as the temperature and relative humidity (RH %) inside the chamber were monitored simultaneously. The temperature outside the measuring chamber was kept constant (24 °C ± 0.5).

It was possible to observe with e-nose different behaviors for the apple with and without the edible film (Figure 1). The Pani-HCl sensor showed a larger response of conductivity to the apple without coating than for the coated apple. In addition, humidity sensor showed a lower percentage of humidity to the coated apple, which indicates that edible film decreased the gas exchange of fruit with environment. These results showed the potentiality to use low cost e-nose to conduct research with edible films during fruit ripeness.

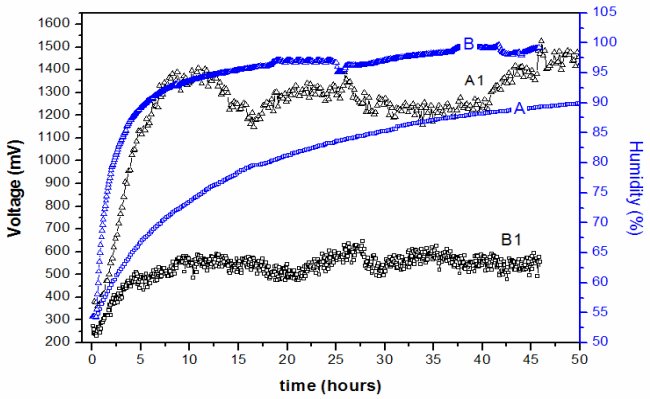

Figure 1: Response of electrical resistance measurements of the low cost e-nose: (A1) apple coated with zein film, (A) humidity corresponding to apple-coated, (B1) apple without coated, (B) humidity corresponding to uncoated apple.

[1] J.M. Scramin; D. Britto; O.B.G. Assis; L.A. Colnago; L.A. Forato. Circular técnica, 37 (2007) 3p.
[2] C. Steffens, A. Manzoli, E. Francheschi, M.L. Corazza, F.C. Corazza, J. Vladimir Oliveira, P.S.P. Herrmann, Synth. Met. 159 (2009) 2329-2331.