

TITLE: ELECTRONIC NOSE BASED ON IONOGEL DOPED WITH Fe₃O₄ PARTICLES APPLIED FOR DISCRIMINATION OF SPOILAGE AND PATHOGENIC MICROORGANISMS IN RAW MEATS

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ABSTRACT

Recently, methods of spoilage and pathogen detection have been modernized aiming to reduce the time of analysis with consequent development of alternative methods as a support tool to reach that goal. An electronic nose (e-nose) is a device that has sensors capable to discriminate gases profiles through the conductivity modulation according to the composition of the analyzed atmosphere to which the sensors are exposed. This property enables the detection of metabolites derived from microbial growth. As an advantage, it is a fast and simple technique and does not require previous treatment of the sample. The aim of this study was to assess the ability of the e-nose in the discrimination of spoilage and pathogenic microorganisms in the meat of different animals species. Five-gram aliquots of beef, pork, and chicken were placed into Falcon tubes and inoculated with 2 CFU log/g of *Salmonella* Typhimurium (ATCC 14028), *Escherichia coli* (ATCC 8739), and *Pseudomonas fluorescens* (ATCC 27853). The inoculated samples were incubated at 20°C and analyzed after 0, 24, 48 and 72 h. Gases released by the bacterial growth during incubation were loaded by an air stream and targeted to a chamber containing 4 modified-interdigitated-gold-electrodes with thin films of ionogel (EMIMDCA confined in bovine skin collagen) doped with different concentrations of Fe₃O₄ particles. Pump system and conductivity recording were conducted with specific software. All data were tabulated and analyzed through principal component analysis (PCA) to verify the discrimination of each inoculated microorganism over the days of incubation. Via clusters formation in PCA Biplot plots, it was observed that e-nose can detect differences in the production of released metabolites with the consequent distinction of microorganisms used in the experiment. This discrimination was significant at 48h of incubation for beef and pork, and for chicken meat at 72 h of incubation. Based on our results, it is possible to affirm that the analysis through the e-nose is a promising tool for food analysis.

Keywords: alternative analysis; conductivity; food; pathogen detection.

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