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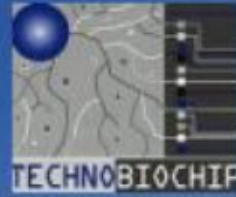
ANAESTHETIC GAS DETECTION BY LIBRANOSE

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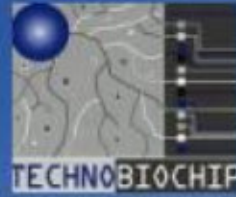
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INTRODUCTION

Occupational exposures to anaesthetic gases have been investigated in several studies. A range of health effects, including neurological, renal, and hepatic disease, reduction in mental performance and manual dexterity were reported for anaesthesiologists, nurses and surgeons [1-3]. Isoflurane is a halogenated volatile anaesthetic which induces and maintains general anaesthesia by depression of the central nervous system and resultant loss of consciousness [4-6].



AIMS

We were aimed to evaluate isoflurane gas detection by the application of an electronic nose system based on quartz crystal microbalance (QCM) technology using metalloporphyrines- and polypyrrole polymers-coated sensors.



MATERIALS AND METHOD

Experiments have been performed by using the Technobiochip's LibraNOSE, an extremely compact QCM-based instrument. We used 20 MHz AT-cut quartzes crystals with gold surface (Gambetti, IT), coated by both metalloporphyrines, deposited by solvent casting, or by polypyrrole polymer films, deposited by Langmuir-Blodgett technology at Technobiochip's thin film deposition service. The Langmuir-Blodgett film deposition has been carried out with the KSV 5000 instrument by using 0.3 mg/ml polymers dissolved in chloroform and ultrapure distilled water as sub-phase. Polypyrrole polymers have been developed at Technobiochip and are patent-pending.

All measurements were performed at 30°C (61% total humidity) and atmospheric air was used as carrier. Isoflurane has been diluted in glass bottles at 487, 243 and 97 ppm. Each sample was measured from three to five times for 5 minutes. Data analysis was performed with Principal Component Analysis (PCA) using the "NasoStat" software developed by SIGEDA (Milan, IT).

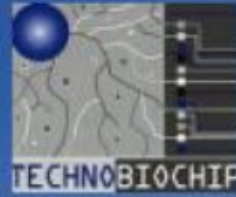


ACTIVE MATRIX USED

Sensor #	Metalloporphyrines
1	Co-butoxytetrphenylporphyrine
2	Mn-butoxytetrphenylporphyrine
3	Cr-butoxytetrphenylporphyrine
4	Cu-butoxytetrphenylporphyrine
5	Ru-butoxytetrphenylporphyrine
6	Zn-butoxytetrphenylporphyrine
7	Sn-butoxytetrphenylporphyrine
8	Fe-butoxytetrphenylporphyrine

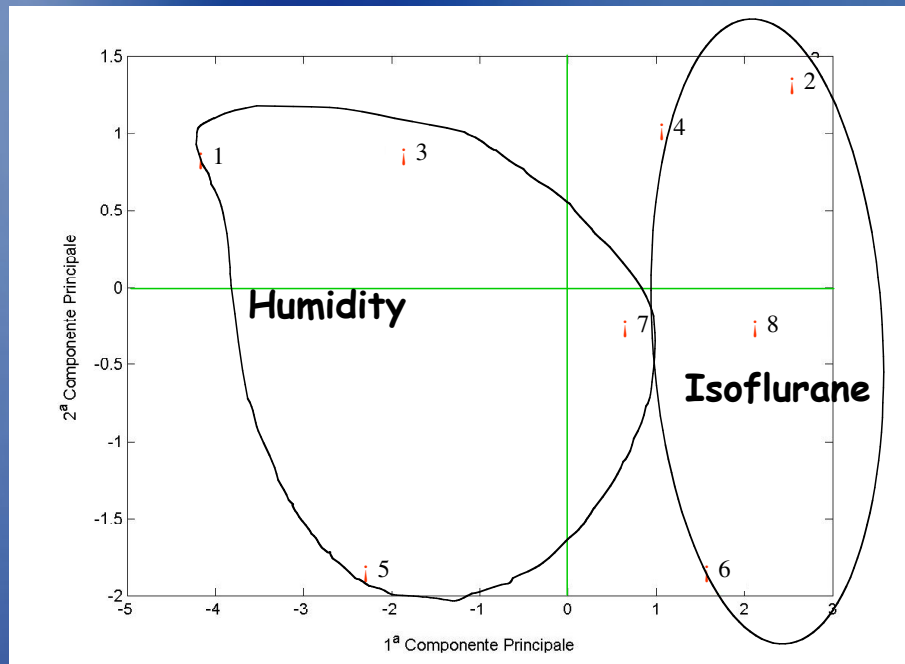
ACTIVE MATRIX USED

Sensor #	Aldehydes	Polymers
1	Phenanthre-9-aldehyde	Poly [2-(-9 phenanthrylmethyl)]-1H-pyrrole
2	Trans-cinnamaldehyde	Poly (2-[2-(2E)-3-phenylpro-2-enyl]-1H-pyrrole
3	Ferrocene carboxaldehyde	Poly [ferrocene]-1H-pyrrole
4	Benzaldehyde	Poly 2- (benzyl)-1H-pyrrole
5	Anisaldehyde	Poly [2-4 (methoxybenzyl)]-1H-pyrrole
6	3-Hydroxy 4-Methoxybenzaldehyde	Poly [2etoxy-5-(1H-pyrrol-2-ylmethyl)] phenol
7	Thiophene-2-carboxyaldehyde	Poly [2-[thien-2-ylmethyl)]-1H-pyrrole



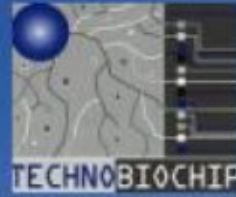
RESULTS-1

Isoflurane was diluted to 487, 243, 184 and 97 ppm and measured by LibraNOSE using the Metalloporphyrine-coated sensors



○ 2	isoflurane	487 ppm
○ 4	isoflurane	243 ppm
○ 6	isoflurane	184 ppm
○ 8	isoflurane	97 ppm

PCA analysis clearly showed that isoflurane is separated from the environment humidity component even at lower isoflurane concentration



RESULTS-2

Moreover, we have tested diluted isoflurane at 97 ppm by using seven sensors coated with different polypyrrole polymers

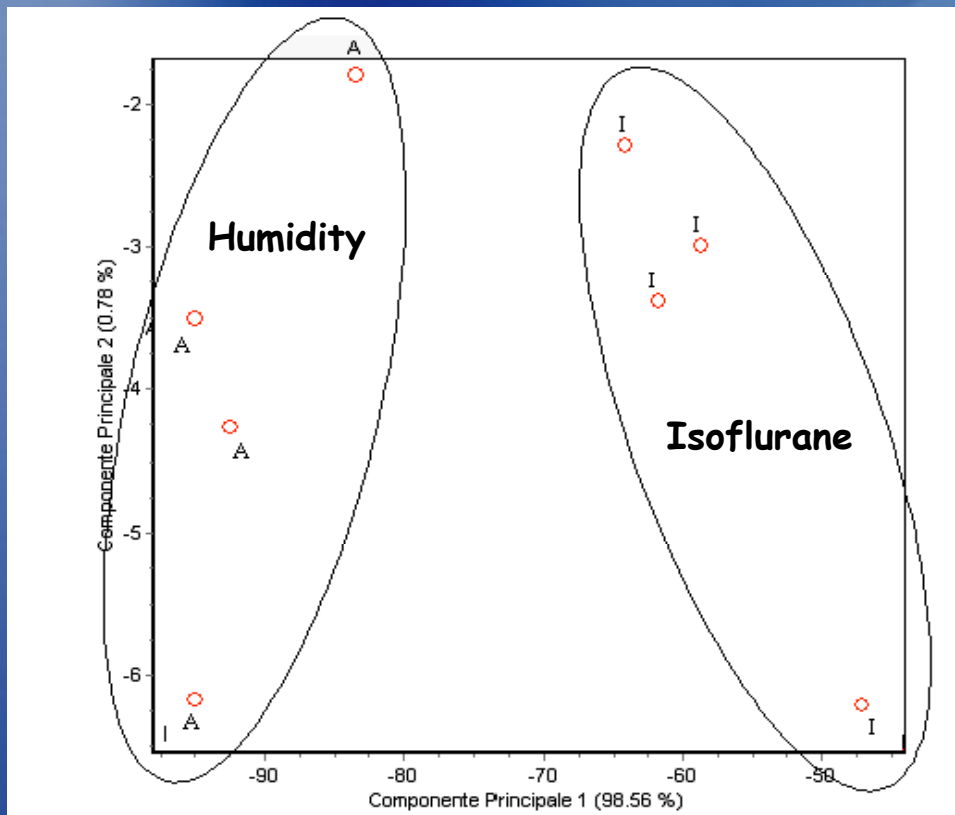
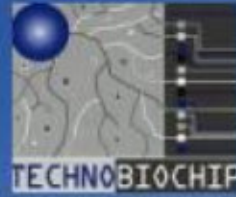


Figure shows that also polypyrrole polymers coated sensors were able to discriminate isoflurane



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