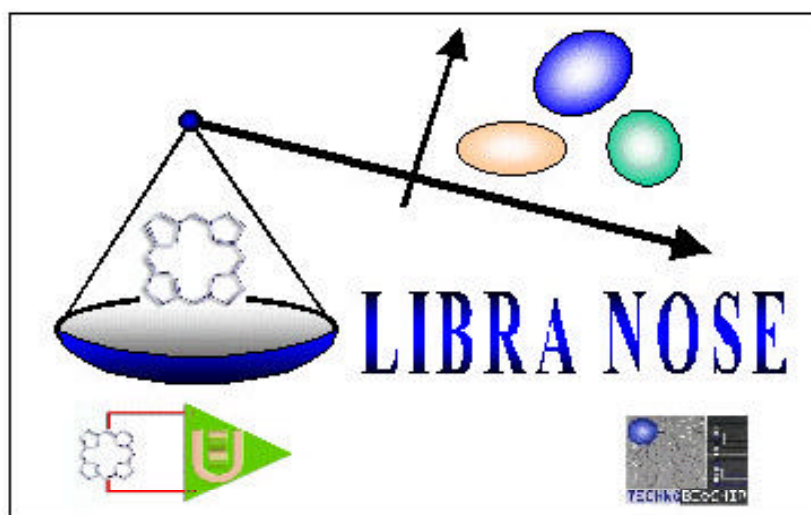


# Application Nose



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# LibraNose

LibraNose consists of a thermostatic measuring chamber, where are placed a set of piezoelectric transducers, a pump with adjustable flow rate and an electro-valve, that can be controlled by software (figure 36). The piezoelectric transducers are eight 20 MHz AT-cut resonant quartz with gold surface purchased by Gambetti Kenologica (Italy), covered by a molecular layer (poly-pyrrole derivatives). The functionality of each sensor is based on the mass variation ( $\Delta m$ ) of the quartz surface, due to a direct interaction between sensor and the analyte. As a consequence it is possible to observe a frequency variation  $\Delta f$  of the quartz fundamental oscillation frequency  $f_0$ , as explained by the Sauerbrey's law.

$$\Delta f = -\frac{C_f f_0^2}{A} \Delta m$$

Where  $A$  is the area of the sensitive layer and  $C_f$  the mass sensitivity constant.

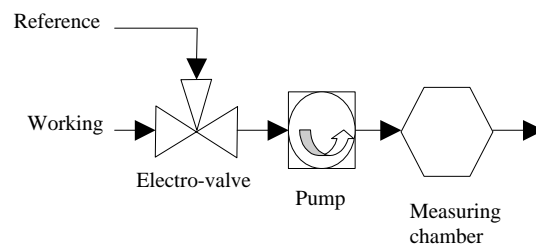


Figure 1: scheme of Libra-nose functioning.

## Publications

2007

1. A.Scarpa, L.Tortora, S.Greco. Polypyrrole-derivatives sensor for traditional Italian cheeses discrimination by libra nose.

## 2006

- 1 A. Scarpa, S. Bernardi, L. Fachechi, F. Olimpico, M. Passamano, S. Greco. Polypyrrole polymers used for 2,4,6-trichloroanisole discrimination in cork stoppers by libraNose. *IMCS 11*, The 11th meeting of chemical societies, Brescia (Italy) 17-19, July.
- 2 A. Scarpa, L. Fachechi, F. Olimpico, M. Passamano, R. Paolesse, S. Greco. Anaesthetic gas detection by libraNose. *IMCS 11*, The 11th meeting of chemical societies, Brescia (Italy) 17-19, July.

## 2005

- 1 A. Scarpa, C. Deidda, D. Del Turco, L. Fachechi, S. Bernardi, S. Mazzola. Polypyrro-derivates nano-gravimetric sensors for electronic nose application to essential oils discrimination. *AISEM*, Italian Conference on Sensors and Microsystems, Florence (Italy) 15-17, February.

## 2004

- 1 A. Scarpa, D. Del Turco, L. Fachechi. Me-porphyrins Application, for nano-gravimetric sensors development, for air quality determination in the environment with crude oil distillation derivatives, *ICPP-3*, 3rd International Conference on Porphyrins and Phthalocyanines, New Orleans, Louisiana, 11-16 July
- 2 A. Scarpa, D. Del Turco, L. Fachechi. Me-porphyrins application, for nano-gravimetric sensors development, in Coffee Quality Control, *ICPP*. 3th International Conference on Porphyrins and Phthalocyanines. *ICPP-3*, 3rd International Conference on Porphyrins and Phthalocyanines, New Orleans, Louisiana, (USA) 11-16 July.

## 2002

- 1 M. Romano, A. Scarpa, S. Sinopoli. Libranose investigation of Coffee Quality. *ISOEN 2002*, Ninth International Symposium on Olfaction and Electronic Noses, Rome (Italy), 29 September - 2 October.
- 2 M. Romano, A. Scarpa, S. Sinopoli. Identification of Explosive Materials by LibraNose. *ISOEN 2002*, Ninth International Symposium on Olfaction and Electronic Noses, Rome (Italy), 29 September - 2 October.
- 3 E. Martinelli, C. Di Natale, M. Romano, A. Scarpa, S. Sinopoli, F. Vernazza, P. Manghi. Discrimination of Commercial Milk Products Based on Independent Component Analysis of

Electronic Nose Data. *ISOEN 2002*, Ninth International Symposium on Olfaction and Electronic Noses, Rome (Italy), 29 September - 2 October.

- 4 M. Amelio, M. Romano, A. Scarpa, S. Sinopoli, E. Martinelli. Application of LibraNose to Olive Oil Quality Control. *ISOEN 2002*, Ninth International Symposium on Olfaction and Electronic Noses, Rome (Italy), 29 September - 2 October.
- 5 M. Romano, A. Scarpa, S. Sinopoli, S. Amarri, A. Macagnano. Helicobacter Pylori Identification by the Analysis of Breath with an electronic nose. *ISOEN 2002*, Ninth International Symposium on Olfaction and Electronic Noses, Rome (Italy), 29 September - 2 October.

# Applications

In the last year, the electronic nose has been tested in many field where odors or odorless volatiles and gases.

## ***Food quality control***

Many foodstuffs produce volatiles in the concentration ranges of fraction of ppm to 1000 ppm which are appropriate to electronic noses.

LibraNose has been experimented on many foodstuff: meat, grains, coffee, beer, mushrooms, cheese, sugar, fish, fruits, juices, alcoholic beverages, and packaging materials.

LibraNose is a rapid and non-destructive technology that can be useful in all points of food industry:

- inspection of prime materials and ingredients
- detection of contraband agricultural products
- detection of true geographical origin of foodstuff: this helps in fulfilling the Protected Designation of Origin
- evaluation of shelf-life, i.e the microbial spoilage on foodstuff
- characterization of aromatic profiles
- standard definition of food quality, on various point of the chain
- packaging: the quality of a product can be often damaged by unpleasant smell of glue, glaze or paints used in the packaging fabrication process. This can produce mass rejection of whole product portions and big loses for manufacturer.

## ***Environmental monitoring***

In ambient air, where the direct monitoring of emissions has been performed by a human panel and by analytical instruments, the introduction of the LibraNose is very challenging. Knowledge in real time of the toxic compounds, or of spatial and time patterns of concentration, is important. It's possible to distinguish between the following application areas:

- monitoring of harmful substances and estimation of odour emissions at the place where people live and work, the unpleasant odours which reduces the quality of life.
- characterization of head space over wastewater or polluted land.
- monitoring of exhaust gas streams directly at the source of emission

## ***Cosmetic and Perfumery Industry***

The labour of the perfume expert is to qualify the product by an olfaction test or to develop new perfumes and fragrances. Years of rigorous and specialised training combined with certain, but not extraordinary, ability of sense of smell are the requirements for performing such a task. What really needs to be extraordinary is the “brain ability” meaning the way to process the data transmitted by the senses.