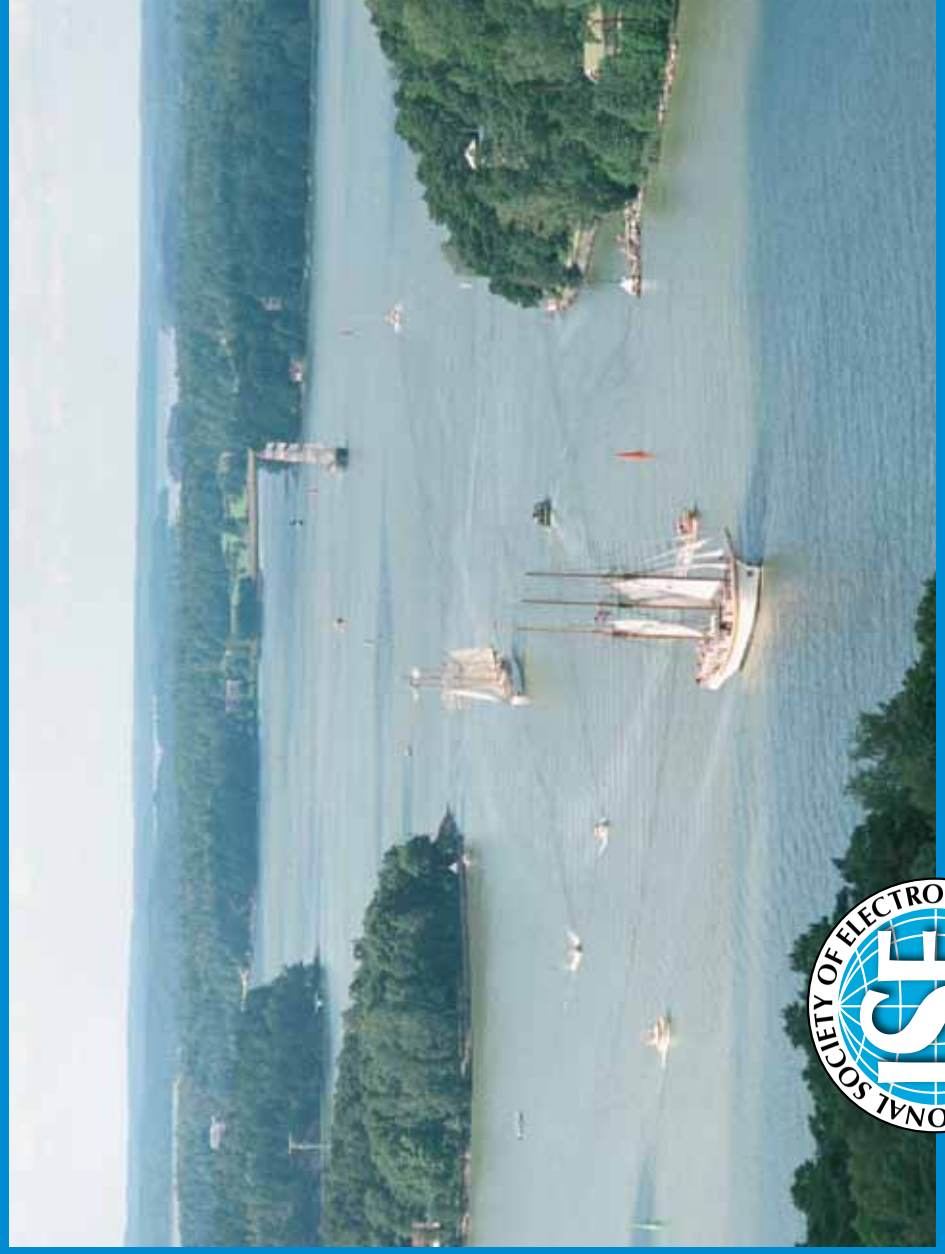
The 9th Spring Meeting

of the International Society of Electrochemistry

Electrochemical Sensors:
From nanoscale engineering
to industrial applications

May 8 to 11, 2011 Turku, Finland



Book of Abstracts

Conference Schedule

Sunday, 8 May		Monday, 9 May		Tuesday, 10 May		Wednesday, 11 May	
		09:00-09:40	**Keynote Address**	09:00-09:40	**Keynote Address**	09:00-09:40	**Keynote Address**
		09:50-10:20	**Oral Presentations**	09:50-10:20	**Oral Presentations**	09:50-10:20	**Oral Presentations**
		10:20-10:40	Coffee Break	10:20-10:40	Coffee Break	10:20-10:40	Coffee Break
		10:40-12:20	**Oral Presentations**	10:40-12:20	**Oral Presentations**	10:40-12:20	**Oral Presentations**
		12:20-13:50	Lunch	12:20-13:50	Lunch	12:20-13:50	Lunch
14:00	**Registration opens**	13:50-14:30	**Keynote Address**	13:50-15:20	**Oral Presentations**	13:50-15:30	**Oral Presentations**
		14:40-16:10	**Oral Presentations**				
		16:10-16:30	Coffee Break			15:30-15:50	Coffee Break
		16:30-17:30	**Oral Presentations**	15:20-17:40	**Poster Session II**	15:50-16:00	**Closing**
17:15-17:45	**Opening**	17:30-19:30	**Poster Session I**				
18:00-19:20	**IYC 2011 session**						
20:00-21:30	**Reception**			19:00-24:00	**Banquet** *Buses leave from the Market Square at 19:00*		

A Hybrid Electronic Tongue for Direct Classification of Baby Liquid Foods With or Without Gluten

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[3]DEQB – Instituto Superior de Engenharia de Coimbra, Coimbra, Portugal
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OBJECTIVES

BABY LIQUID FOODSTUFFS ANALYSED – To apply an all-solid-state potentiometric hybrid electronic tongue to detect baby Liquid Foods with or without Gluten.

CELIAC DISEASE – Infant suffering from celiac disease are gluten intolerant and inadvertent ingestion of gluten proteins must be avoided.

ANALYTICAL TECHNIQUES ALREADY AVAILABLE – to detect/quantify gluten proteins in foodstuffs (e.g.):

- Immunochemical methods, mass tandem spectrometry and polymerase chain reaction as well as gluten sensors [1]
- Potentiometric electronic tongue (ET) with lipo/polymeric membranes [2]

HOWEVER

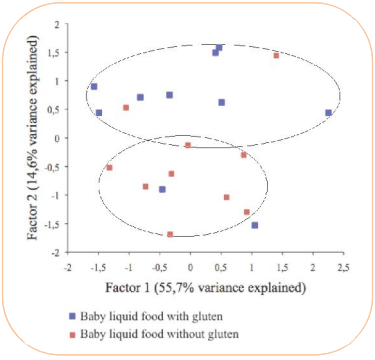
ANALYTICAL PROBLEM – All the analytical techniques require the previous extraction of gluten proteins. This step can be a possible drawback as it is not possible to guarantee that the extraction has a 100% yield as the protein types overlap in solubility and extractability [3].

NEW MULTI-SENSOR DEVICE APPROACH PROPOSED – Extraction or dilution/dissolution step **NOT** required.

SAMPLES ANALYSED – In total, 5 "gluten-free" and 10 "gluten-containing" liquid baby foods of different flavors were purchased at local supermarkets and analyzed.

RESULTS

Principal components analysis – signals profiles with valuable information allowed grouping the samples in mainly two groups.



Linear discriminant analysis - correct classification of 95% of the samples (leave-one-out cross-validation process) being only one baby liquid food containing gluten misclassified as gluten-free.

[1] L. De Stefano et al., J. Proteome Res. 5 (2006) 1241-1245.
[2] A.M. Peres et al., Talanta 83 (2011) 857–864.
[3] F.M. Dupont et al., J. Agric. Food Chem. 53 (2005), 1575-1584.

Acknowledgements: Financial support received from FCT, Lisbon, under research project PPCDT/QUI/58076/2004 is gratefully acknowledged.
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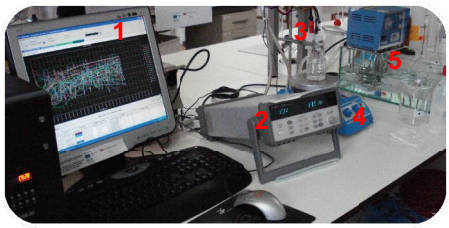
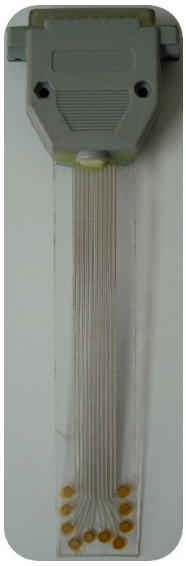
EQUIPMENT AND SENSORS USED



Multi-sensor system:
1- PC for data acquisition;
2- DataLogger Agilent;
3- E-tongue device in a double glass cell thermostatized;
4- Magnetic stirrer;
5- Thermostatic bath.

Additives and plasticizers used for polymeric membranes preparation:

Membrane Additive substance	Plasticizer substance
Octadecylamine	Dibutyl sebacate
Bis(2-ethylhexyl)phosphate	Dibutyl sebacate
Oleyl alcohol	Dibutyl sebacate
Methyltrioctylammonium chloride	Dibutyl sebacate
Tridodecylmethylammonium chloride	Dibutyl sebacate
Oleic acid	Dibutyl sebacate
Dibenzo-18-crown-6	Dibutyl sebacate
Mg ionophore	2-NPOE
Ca ionophore	2-NPOE
Na ionophore	2-NPOE
K ionophore	2-NPOE
Sulfate ionophore	2-NPOE
Nitrate ionophore	2-NPOE
Ammonium ionophore	2-NPOE



Each cross-sensitivity membrane:
- 31.8-32.3% of PVC
- 64.8-65.1% of the plasticizer
- 2.9-3.1% of one of the membrane additives

Each ion selective membrane:
- 32.8-33.6% of PVC
- 61.5-62.3% of the plasticizer
- 4.7-5.1% of one of the membrane additives

MULTI-SENSOR DEVICE
New methodology
Faster
Low cost
Quite reliable

CONCLUSIONS – Although further studies are needed, the satisfactory preliminary results described here demonstrate the ability of the hybrid ET to be used as a rapid and disposable practical tool for quality control of liquid foods for babies suffering from gluten intolerance.