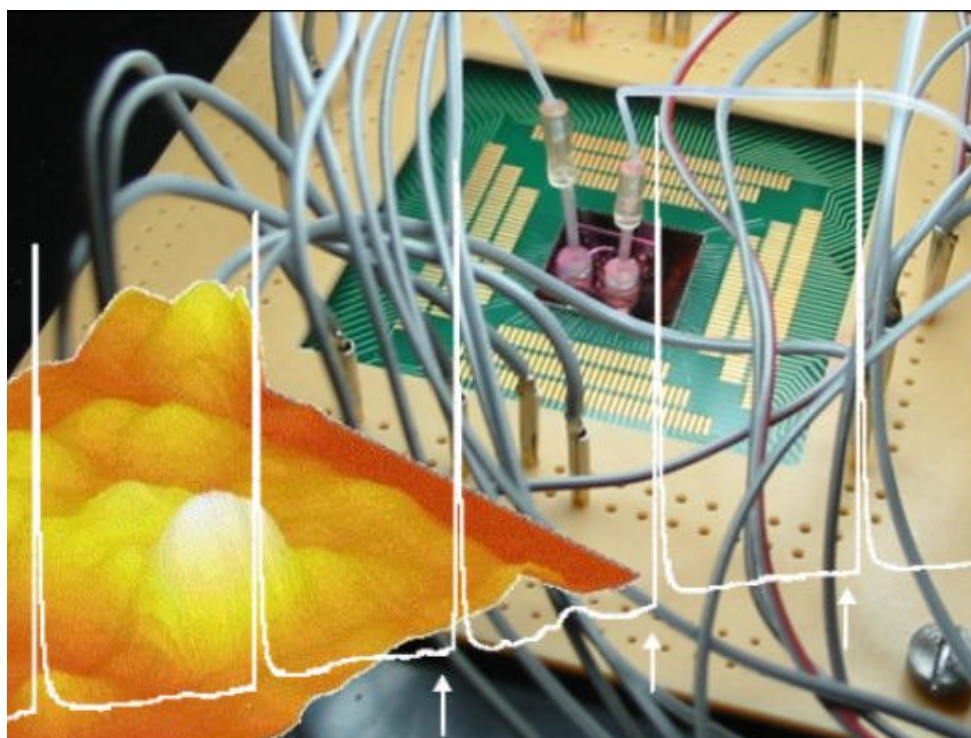


**The Report 2001-03**



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### **SYNOPTIC VIEW OF THE PROJECT**

- **STAFF**
- **AIM OF THE PROJECT**
- **KEYWORDS**
- **RELEVANT PAPERS**
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- **THESES**
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- **PARTNERS**

### **FULL TEXT PAPERS**

### **POSTERS**

### **THE 6<sup>TH</sup> IAEAC BIOSENSOR WORKSHOP**

## STAFF

**Senior Scientists:** R.Franconi, D.Masci, L. Mosiello, L.Nardi, R.Pilloton,

**Scientists:** S.Impiombato, C.Laconi, M.R.Montereali, V.Pinto, M.Tosi,

**PostDocs:** F.Dalla Riva, Anna Krasilnikova, J.Maly; Celine Ndong, E.Podestà, S.Timur, W.Vastarella

**Students:** A.Volpe, E.Magarò, Chiara Di Meo, A.Boni, L.Della Seta, S.Marino,

**Technicians:** A.Masci, M.De Francesco, A.Lucchi,



## AIM OF THE TARGET PROJECT

Biosensors and bioelectronics represent different points of view of the same technology which is intended for mass production of hybrid devices based on the so called "smart properties" of natural molecules and technological materials.

Several biomolecules were extensively studied in the past as functional and active interfaces for sensing or bioelectronic purposes. The most common example is represented by biosensors which are obtained by coupling a biomediator with a transducer. Many natural molecules were purified and used for obtaining both enzyme sensors or imunosenors, and, recently, a large spectrum of natural biomolecules were also investigated, including olfactory receptors and oligonucleotides as sensing elements.

Biosensors, biological transduction and bioelectronic information storage are the main interesting research areas which will be commercially exploited in the near future. At the moment several biomolecules are used for commercially available analytical devices, but the critical factors for their use are mainly related to their stability and optimal (oriented) immobilisation, without loss of functional properties, on electronic or optical components. Hybrid, synthetic, natural molecules, including their active fragments or modified derivatives, can be used. Genetic engineered biomolecules seem to be a new and powerful approach for obtaining simpler artificial structures with intact or improved properties (i.e. stability, sensitivity and specificity), or with additional functional groups and activities. For example, an His<sub>6</sub> tag can be used for oriented and reversible immobilization of engineered single-chain antibody fragments (scFvs), or gene fusions with enzymatic activities may allow analytical detection based on phosphatases. Not only biosensing will take advances from the availability of powerful artificial molecular structures, but also a new generation of  $\mu$ -electronic devices will be certainly affected by this new approach. As a matter of fact, nano-technologies allow increased spatial resolution for electronic and bioelectronic components.

The CoSMiC project at Enea, started on January 2001, is approaching this research activity with a multidisciplinary group of scientists (chemists, physicists, molecular biologists etc.), with the aim of selection and mass production of artificial molecules which mimic the natural ones, deposition of them on the macro scale by printing techniques or LB films, and, on the  $\mu$ -scale, by laser assisted  $\mu$ -lithography. Oligonucleotides and carbon nanotubes are also investigated for their interesting conducting properties at the nano scale.

## KEYWORDS

biosensors, bioelectronics, nanotechnologies, engineered proteins, GMMOs, synthetic molecules, thin and thick film deposition, coatings

## RELEVANT PAPERS

- A.Boni, E.Magaró, M.Tosi, W.Vastarella and R.Pilloton; **ANTICHOLINESTERASE ACTIVITY ON GRAPES BY PURIFIED ENZYMES, ENGINEERED YEASTS AND SPGE**, Analytical Letters, in press
- J.Maly, A.Masci, J.Masojidek, M.Sugiura and R.Pilloton; **MONOLAYERS OF NATURAL AND RECOMBINANT PHOTOSYSTEM II ON GOLD ELECTRODES - POTENTIALS FOR USE AS BIOSENSORS FOR DETECTION OF HERBICIDES**, Analytical Letters, in press
- Suna Timur, Livia Della Seta, Nurdan Pazarlioglu, Roberto Pilloton, Azmi Telefoncu; **SCREEN PRINTED GRAPHITE BIOSENSORS BASED ON BACTERIAL CELLS**; Process Biotechnology, in press.
- E.Podesta', C.Botre', R.Pilloton, F.Botre', F.Mazzei; **A SCREEN-PRINTED ENZYMATIC ELECTRODE FOR THE DETERMINATION OF ORGANO-PHOSPHOROUS PESTICIDES**; Sensors and  $\mu$ -Systems C. Di Natale & A. D'amico Ed. - World Scientific, Singapore - New Jersey - London - Hong Kong; 2003 in press
- C.Di Meo, L.Della Seta, M.De Francesco, A.Masci, V.Pinto, A.Volpe, and R.Pilloton; **REVERSIBLE IMMOBILISATION OF ENGINEERED MOLECULES BY NI-NTA CHELATORS**; Sensors and  $\mu$ -Systems C. Di Natale & A. D'amico Ed. - World Scientific, Singapore - New Jersey - London - Hong Kong; 2003 in press
- L.Della Seta, S.Marino, A.Masci, R.Pilloton; **SCREEN PRINTED BIOSENSORS BASED ON OXYGEN SENSING: USE OF PERM SELECTIVE MEMBRANES**; Sensors and  $\mu$ -Systems C. Di Natale & A. D'amico Ed. - World Scientific, Singapore - New Jersey - London - Hong Kong; 2003 in press
- Alessio Boni, Eugenia Magarò, Marina Tosi, Walter Vastarella and Roberto Pilloton; **SCREEN PRINTED ELECTROCHEMICAL BIOSENSORS BASED ON RECOMBINANT MOLECULES AND CELLS**; UNEP Reports; 2003 in press
- J.Maly, C.Di Meo, M.De Francesco, A.Masci, J.Masojidek, M.Sugiura, A.Volpe, R.Pilloton; **REVERSIBLE IMMOBILISATION OF ENGINEERED MOLECULES BY Ni-NTA CHELATORS**; Bioelectrochemistry 2003 in press
- Timur, Suna; Pazarlioglu, Nurdan; Pilloton, Roberto; Telefoncu, Azmi; **DETECTION OF PHENOLIC COMPOUNDS BY THICK FILM SENSORS BASED ON PSEUDOMONAS PUTIDA**; Talanta Volume: 61, Issue: 2, October 17, 2003, pp. 87 - 93
- Maly, J.; Illiano, E.; Sabato, M.; De Francesco, M.; Pinto, V.; Masci, A.; Masci, D.; Masojidek, J. R.franconi, R.Pilloton; **IMMOBILISATION OF ENGINEERED MOLECULES ON ELECTRODES AND OPTICAL SURFACES**; Materials Science and Engineering: C Volume: 22, Issue: 2, December 1, 2002, pp. 257-261

- Michal Koblizek, Jan Maly, Jirý Masojidek, Josef Komenda, Tomas Kucera, Maria T. Giardi, Autar K. Mattoo and Roberto Pilloton; **A BIOSENSOR FOR THE DETECTION OF TRIAZINE AND PHENYLUREA HERBICIDES DESIGNED USING PHOTOSYSTEM II COUPLED TO A SCREEN PRINTED ELECTRODE - BIOTECHNOLOGY AND BIOENGINEERING**, VOL. 78, NO. 1, APRIL 5, 2002.
- L.Della Seta; A.Masci and R.Pilloton; **A NEW LAY-OUT FOR SCREEN-PRINTED ELECTRODES: FRONT/BACK GEOMETRY**; Sensors and  $\mu$ -Systems C. Di Natale & A. D'amico Ed. - World Scientific, Singapore - New Jersey - London - Hong Kong; 2002
- S.Timur, A.Telefoncu, A.Masci and R.Pilloton; **OXIDIZED CARBON POWDER FOR ENZYME IMMOBILIZATION ON SCREEN PRINTED BIOSENSORS**; Sensors and  $\mu$ -Systems C. Di Natale & A. D'amico Ed. - World Scientific, Singapore - New Jersey - London - Hong Kong; 2002
- L.Campanella, G.Favero, S.Marino, R.Pilloton and M.Tomassetti; **DISPOSABLE SCREEN PRINTED POTENTIOMETRIC SENSORS FOR DETERMINATION OF FREE RADICALS**; Sensors and  $\mu$ -Systems C. Di Natale & A. D'amico Ed. - World Scientific, Singapore - New Jersey - London - Hong Kong; 2002
- M. Koblizek, J. Komenda, J. Masojidek, T. Kucera, A.R. Mattoo, M.T. Giardi, R. Pilloton; **TWO PHOTOSYSTEM II-BASED BIOSENSOR FOR DETECTION OF PHOTOSYNTHETIC HERBICIDES**; Proceedings of The 2nd Workshop on Chemical Sensors and Biosensors 1999 March 18th-19th - F.Mazzei & R.Pilloton Eds. - (2000) ISBN 88-8286-072-8
- P. Morales, L. Giulietti, L. Mosiello, R. Pilloton; F. Bordoni, G. De Gasperis, S. Sperandii, S. Santucci, E. Di Fabrizio; **BIOLOGICAL AND ORGANIC MOLECULES PHOTOIONIZATION FOR BIOMOLECULAR DEVICE FABRICATION**; Proceedings of The 2nd Workshop on Chemical Sensors and Biosensors 1999 March 18th-19th - F.Mazzei & R.Pilloton Eds. - (2000) ISBN 88-8286-072-8
- S. Marino, A.Masci, G. Minervini, M.R. Montereali, C. Cremisini e R. Pilloton; **SCREEN PRINTING" FOR CHEMICAL SENSOR AND BIOSENSOR PRODUCTION**; Proceedings of The 2nd Workshop on Chemical Sensors and Biosensors 1999 March 18th-19th - F.Mazzei & R.Pilloton Eds. - (2000) ISBN 88-8286-072-8
- L.Mosiello, C.Cremisini, L.Segre, S.Chiavarini, M.Spanò, T.Kimmel, A.Baumner, R.D.Schmid; **DIPSTICK IMMUNOASSAY FORMAT FOR TERBUTHYLAZINE ANALYSIS IN WATER SAMPLES**; Proceedings of The 2nd Workshop on Chemical Sensors and Biosensors 1999 March 18th-19th - F.Mazzei & R.Pilloton Eds. - (2000) ISBN 88-8286-072-8
- M.Rizzuto, C.Polcaro, C.Desiderio, M. Koblizek, R.Pilloton, M.T.Giardi ; **HERBICIDE MONITORING IN SURFACE WATER SAMPLES WITH A PHOTOSYSTEM-II BASEF BIOSENSOR**; Proceedings of The 2nd Workshop on Chemical Sensors and Biosensors 1999 March 18th-19th - F.Mazzei & R.Pilloton Eds. - (2000) ISBN 88-8286-072-8

- A.Masci, Della Seta L., S.Galluppi, C.Micheli, R.Pilloton; **A SMALL AND INEXPENSIVE BIOSENSOR BASED DEVICE FOR ON LINE EVALUATION OF MICROALGAE METABOLISM INHIBITION**; Proceedings of The 2nd Workshop on Chemical Sensors and Biosensors 1999 March 18th-19th - F.Mazzei & R.Pilloton Eds. - (2000) ISBN 88-8286-072-8
- Carlo Cremisini, Roberto Pilloton, Lia Segre, Amedeo Masci; **NUOVI POLIMERI SINTETICI PER IL RICONOSCIMENTO MOLECOLARE**; Energia Ambiente e Innovazione; Bimestrale ENEA 2000, 5
- Roberto Pilloton e Franco Mazzei; **WORKSHOP ALL'ENEA SUI SENSORI CHIMICI E BIOSENSORI**; Energia Ambiente e Innovazione; Bimestrale ENEA 2000, 3
- Carlo Cremisini, Roberto Pilloton\*, Lia Segre; **BIOSENSORI: UN CAMPO DI RICERCA IN CONTINUA ESPANSIONE**; Energia Ambiente e Innovazione; Bimestrale ENEA 2000, 3
- Michal Koblizek, Jiri Masojidek, Josef Komenda, Tomas Kucera, Roberto Pilloton, Autar K. Mattoo, Maria T. Giardi; **A SENSITIVE PHOTOSYSTEM II-BASED BIOSENSOR FOR DETECTION OF A CLASS OF HERBICIDES**; BIOTECHNOLOGY AND BIOENGINEERING, VOL. 60, NO. 6, DECEMBER 20, 1998

## UPCOMING EVENTS

### The 6th International Workshop on Biosensors and $m$ -Analytical Techniques for Environmental and Clinical Analysis

## PAST EVENTS

#### □ Roberto Pilloton,

Visiting Scientist at Ege University Izmir, Bornova, Turkey

Visiting Scientist at Pamukkale University, Delizny, Turkey

9-20 December 2003

- MONOLAYERS OF NATURAL AND RECOMBINANT PHOTOSYSTEM II ON GOLD ELECTRODES
- BIOSENSORS BASED ON CHOLINESTERASE ACTIVITY INHIBITION
- IMMOBILISATION OF PURIFIED ENZYMES, ENGINEERED MOLECULES AND ENGINEERED YEASTS ON GOLD, CARBON AND CARBON/GOLD COMPOSITES

#### □ Walter Vastarella, Marina Tosi, Amedeo Masci, Roberto Pilloton,

Screen Printed Electrochemical Biosensors: Fancy Or Valide Alternative For Environmental Analysis?

ARG Convention

24th-28th November 2003

Trieste, Italy

#### □ Roberto Pilloton, Walter Vastarella, Amedeo Masci,

Screen Printed Electrodes: study of reproducibility, stability and sensitivity

20-21 October 2003

Barcelona, Spain

#### □ International Workshop on Biosensors for Food Safety and Environmental Monitoring

October 9-11,2003

Marrakech, Morocco

- A.Boni, E.Magaró, M.Tosi, W.Vastarella and R.Pilloton; ANTICHOLINESTERASE ACTIVITY ON GRAPES BY PURIFIED ENZYMES, ENGINEERED YEASTS AND SPGE
- J.Maly, A.Masci, J.Masojidek, M.Sugiura and R.Pilloton; MONOLAYERS OF NATURAL AND RECOMBINANT PHOTOSYSTEM II ON GOLD ELECTRODES - POTENTIALS FOR USE AS BIOSENSORS FOR DETECTION OF HERBICIDES

□ J.Maly, C.Di Meo, M.De Francesco, A.Masci, J.Masojidek, M.Sugiura, A.Volpe, R.Pilloton;  
Reversible Immobilisation of engineered molecules by Ni-NTA ChelatorS<sub>2</sub>  
XVII<sup>th</sup> International Symposium on Bioelectrochemistry and Bioenergetics,  
June 19-24 , 2003  
Florence, Italy

□ Roberto Pilloton & Giulio Izzo

Gestione dell'ambiente acquatico: valutazione del rischio e della qualità ecologica dal livello di comunità al livello molecolare.

18-19 June 2003

ENEA Casaccia, Rome, Italy

- Marco Mascini (Università di Firenze) - Biosensori elettrochimici a DNA
- Roberto Pilloton (ENEA-BIOTEC-MED) - Biosensori elettrochimici ad inibizione basati su molecole e cellule ricombinanti
- Aldo Roda (Università di Bologna) - Biosensori luminescenti basati su cellule ricombinanti per la determinazione di metalli e contaminanti organici in matrici acquifere
- Franco Mazzei (Università di Roma) - Sistemi elettrochimici ad inibizione: aspetti generali ed applicabilità nel controllo degli ecosistemi acquatici.
- Luigi Campanella (Università di Roma) - Il contributo della chimica al controllo della tossicità integrale dei sistemi idrici

□ Roberto Pilloton & Giuseppe Palleschi (Universita' di Tor Vergata Roma)

RoseProMilk Project MidTerm Meeting and Steering Board Meeting

16 May 2003

ENEA Casaccia, Rome, Italy

- Roberto Pilloton, Amedeo Masci, Flavia Dalla Riva, Lucia Mosiello, Celine Ndong - SPE immunosensors at Enea
- Maria Velasco-Garcia: Silsoe Research Institute, Cranfield, UK) - Specification for an automated analyser for faecal wash
- Emanuele Marconi (Università del Molise) - Validation of Aflatoxin M1 procedures and setup of reference procedures
- Laura Micheli (Universita' di Tor Vergata Roma) Aflatoxin-AP Conjugates
- Manpreet K. Khurana and Pankaj Vadgama (Queen Mary University, UK) - Development of polymeric membranes to improve the sensitivity, selectivity and stability of chlorophyll sensors
- John Hart, Roy Pemberton (University of West England, UK) - The Voltammetric Measurement of Chlorophyll using Screen-Printed Sensors

- Jeanette Pritchard GEM Technology, Cranfield UK - SPE: examples of sensor design and array @ GEM

#### □ AISEM 2003

February 2003,

ITC-IRST, Trento, Italy

- E.Podesta', C.Botre', R.Pilloton, F.Botre', F.Mazzei; A SCREEN-PRINTED ENZYMATIC ELECTRODE FOR THE DETERMINATION OF ORGANO-PHOSPHOROUS PESTICIDES;
- C.Di Meo, L.Della Seta, M.De Francesco, A.Masci, V.Pinto, A.Volpe, and R.Pilloton; REVERSIBLE IMMOBILISATION OF ENGINEERED MOLECULES BY NI-NTA CHELATORS;
- L.Della Seta, S.Marino, A.Masci, R.Pilloton; SCREEN PRINTED BIOSENSORS BASED ON OXYGEN SENSING: USE OF PERM SELECTIVE MEMBRANES;

#### □ Roberto Pilloton,

COSMIC @ CEA

October 21st, 2002

Saclay, France

#### □ Roberto Pilloton,

Biosensing?: Why not? An informal meeting @ ENEA

July 16th, 2002

ENEA Casaccia, Rome, Italy

- Roberto Pilloton - Electrochemical Biosensors Lab @ Enea
- Jan Maly Univ. of South Bohemia, Ceské Budejovice, Czech Republic - Determination of herbicide isoproturon in soil extracts using photosystem II based biosensor - persistence and movement of herbicides
- Miwa Sugiura - CEA Saclay - DSV/DBCM/SBE, France - Osaka Prefecture University Osaka, Japan - Property and structure of His-tagged PSII core complexes from *Thermosynechococcus elongatus*
- Josef Komenda, Inst. Microbiol., Opatovický mlyn, Trebon, Czech Republic- Structural and functional dynamics of the photosystem II complex in cyanobacteria
- Jiri Masojidek, Inst. of Microbiology, Academy of Sciences, Trebon, Czech Republic - Photosynthetic biotechnologies in the frame of the National Research Centre "Mechanisms, Ecophysiology and Biotechnology of Photosynthesis"
- Richard A. Durst ( Cornell University, Geneva, NY, USA) - Biosensors for femtomolar level detection of cholera and botulinum toxin using nano-vesicles and ganglioside receptors
- Antje J. Bäumner (Cornell University, Ithaca, NY, USA) - Biosensors and bioanalytical microsystems for the detection of pathogenic organisms

- Elisabetta Podestà (University of Rome – La Sapienza) - A screen-printed enzymatic electrode for the determination of organophosphorous pesticides
- Laura Micheli - University of Rome – Tor Vergata - An electrochemical immunosensor for the Aflatoxin M1 determination in milk using screen printed electrodes

□ Timur, Suna; Pazarlioglu, Nurdan; Pilloton, Roberto; Telefoncu, Azmi;

DETECTION OF PHENOLIC COMPOUNDS BY THICK FILM SENSORS BASED ON PSEUDOMONAS PUTIDA;

The 5th Worksgop on Biosensors and Analytical techniques in Environmental Monitoring (IAEAC)

June 2002

Ithaca (NYS) USA

□ AISEM 2002

February 2002

Bologna, Italy

- L.Della Seta; A.Masci and R.Pilloton; A NEW LAY-OUT FOR SCREEN-PRINTED ELECTRODES: FRONT/BACK GEOMETRY;
- S.Timur, A.Telefoncu, A.Masci and R.Pilloton; OXIDIZED CARBON POWDER FOR ENZYME IMMOBILIZATION ON SCREEN PRINTED BIOSENSORS;
- L.Campanella, G.Favero, S.Marino, R.Pilloton and M.Tomassetti; DISPOSABLE SCREEN PRINTED POTENTIOMETRIC SENSORS FOR DETERMINATION OF FREE RADICALS;

□ Maly, J.; Illiano, E.; Sabato, M.; De Francesco, M.; Pinto, V.; Masci, A.; Masci, D.;

Masojidek, J., R.franconi, R.Pilloton

IMMOBILISATION OF ENGINEERED MOLECULES ON ELECTRODES AND OPTICAL SURFACES ECOF 8

September 2001

Otranto (Le) Italy

□ Roberto Pilloton & Franco Mazzei, The 2nd Workshop on Chemical sensors and Biosensors

18-19 March 1999

ENEA Casaccia, Rome, Italy

- P. Morales, L. Giulietti, L. Mosiello, R. Pilloton; F. Bordoni, G. De Gasperis, S. Sperandii, S. Santucci, E. Di Fabrizio; BIOLOGICAL AND ORGANIC MOLECULES PHOTOIONIZATION FOR BIOMOLECULAR DEVICE FABRICATION
- S. Marino, A.Masci, G. Minervini, M.R. Montereali, C. Cremisini e R. Pilloton; SCREEN PRINTING" FOR CHEMICAL SENSOR AND BIOSENSOR PRODUCTION

- L.Mosiello, C.Cremisini, L.Segre, S.Chiavarini, M.Spanò, T.Kimmel, A.Baumner, R.D.Schmid; DIPSTICK IMMUNOASSAY FORMAT FOR TERBUTHYLAZINE ANALYSIS IN WATER SAMPLES
- M.Rizzuto, C.Polcaro, C.Desiderio, M. Koblizek, R.Pilloton, M.T.Giardi ; HERBICIDE MONITORING IN SURFACE WATER SAMPLES WITH A PHOTOSYSTEM-II BASED BIOSENSOR;
- A.Masci, Della Seta L., S.Galluppi, C.Micheli, R.Pilloton; A SMALL AND INEXPENSIVE BIOSENSOR BASED DEVICE FOR ON LINE EVALUATION OF MICROALGAE METABOLISM INHIBITION
- Giuliano Martinelli, Maria Cristina Carotta, Vincenzo Guidi, Cesare Malagù and Enrico Traversa - Thick Film Gas Sensors Based on Nanosized Semiconducting Oxides.
- G. Di Francia, L. Quercia, V. La Ferrara, L. Lancellotti, C. Baratto, E. Comini, G. Faglia and G. Sberveglieri - Applications of Porous Silicon as a Gas Sensor.
- M. Penza - Surface Acoustic Wave Devices for Gas Sensing Applications.
- P.Pelosi, K.Persaud - Physiological and Artificial Systems for Odour Recognition
- G. D'agostaro - Olfactory Receptors: from Cloning to Function
- M. Pardo, G. Niederjaufer, E. Comini, G. Faglia, G. Sberveglieri - Electronic Nose For Food And Other Applications
- P. Siciliano, R. Rella, L. Vasanelli, S. Capone, M. Epifani, A. Licciulli - Metal Oxide Gas Sensors Prepared by Sol-gel Technology and Their Application in Electronic-Nose.
- L. Leo, G. Mele, G. Rosso, G. Stasi, L. Valli, G. Vasapollo - Deposition of Phthalocyanines and Porphyrins
- F. Botrè, F. Buiarelli, F. Mazzei - Electrochemical Sensors and Biosensors for the Detection of Doping Substances and Methods.
- T. Ferri, A. Poscia, R. Santucci - Direct Electrochemistry of Membrane-Entrapped Horseradish Peroxidase.
- D. Compagnone, D. Moscone, G. Palleschi - Amperometric Biosensors for food quality control. Determination of biogenic amines, lactulose and glycerol
- S. Tombelli, G. Marrazza, M. Mascini - Recent Advances on DNA Biosensors
- R. Franconi, A. Desiderio, P. Roggero, E. Benvenuto - Isolation of Recombinant Single-Chain Antibodies (scFvs) with Desired Specificity from a 'Single-Scaffold' Phage Display Library
- A.R Sprocati, V. Capuano, G. Antonini, P.D. Valenti, A. Aiello - Monitoring Water Quality in Aquaculture with a New Sensor for Microorganisms and Toxicity
- L. Tedeschi, A. Ahluwalia, C. Domenici, F. Baldini, C. Preininger, A. Mencaglia - Protein Immobilisation on Solid Substrates for the Realisation of Optical Immunosensors
- L. Campanella, G. Favero, L. Persi, M.P. Sammartino, M. Tomassetti, G. Visco - Recent Development of Environmental Sensors

- F. Mazzei, F. Botrè - Inhibition Based Biosensors: Environmental Applications
- L. Campanella, G. Favero, M.P. Sammartino, M. Tomassetti - OPEEs – What are they?
- E. Podestà, B. Silvestrini, C. Botrè - Alternative Methods to Animal Testing: the Role of Biosensors
- M.Adami, G.Martinazzo, S.Villari, M.Panza and C.Nicolini - Heavy Metals and Lactate Monitoring Systems
- C. Cantale, M. Oriolo, M. Paci, M. Sperandei - A Synthetic System Mimics the Electron Transfer in Membranes: Synthesis and Characterization of the Proteic Scaffold
- J. Masojídek, J. Malý, S. Alessandrelli, M. Koblížek, M. Rizzuto, B. Geiken, J. Kopecký, J. Komenda, O. Prašil and M.T. Giardi - Effect of Heavy Metals on the Structure and Function of Photosystem II: Potential and Prospects for Use as Bioindicator
- M.Pizzichini, M. Spadoni; R.Montani - Tannery Process Regulation with On Line Cr(III) Monitoring
- I. Palchetti, L. Lepore, M. Mascini - Screen-Printed Electrodes for the Detection of Heavy Metals
- S. De Vita, N. Luisetto, C. Pinelli, E. Dalla Turca - Simple and Fast Determination of Lactose and Lactulose in Raw and UHT Milk Using Differential pH-Technique
- R. Rella, L. Valli, P. Siciliano, L. Vasanelli - Ellipsometric and Surface Plasmon Resonance Study of LB Films of Organic Materials in Controlled Atmosphere.
- M. Casarci, C.Neri, O. Li Rosi, L. Gardossi, C. Erbert, L. De Martin - Immobilization and Adsorption of Idrolase onto Aerogel Matrices: a Preliminary Study.
- G. Di Francia, S. La Ferrara, S. Manzo, L. Quercia, V. La Ferrara, L. Lancellotti - Feasibility of an Optical Biosensor Based on Porous Silicon
- G.C.Angelini, E.Pace, D.Esposito, M.Rizzuto, M.T. Giardi - Effects of Gamma-radiation on Photosystem II Activities for the Realisation of Biosensors.
- M. Santucci,, M. Portaccio,, M.S. Mohy Eldin, S.Rossi, U. Bencivenga, F.S. Gaeta and D.G. Mita, - Investigation of the Effect of Temperature Gradients on the Response of a Glucose Biosensor
- L. Campanella, L. Persi, M. Tomassetti - Superoxide and Nitric Oxide Radicals as Modulating Agents of Enzymatic Sensor Responses.
- R. Raiteri,, S. Martinoia, M. Grattarola, H.-J. Butt - Silicon Microcantilever Based Biochemical Surface Stress Sensors
- F.Baldini, A.Falai, A.Flamini - Optical Characterization of a New Indicator Dye Covalently Bound on Controlled Pore Glasses, Potentially Suitable as Optical Transducer for Hg(II)

- A. Furlani, M. V. Russo, P. Altamura, I. Fratoddi, and C. Caliendo - Polymeric Membranes for Humidity Sensors.
- A. Curulli, and G. Palleschi - Construction and Application of Highly Selective Sensors and Biosensors Using Non-Conducting Electropolymerized Films
- Alessandra Crisà, Federica Forbici, Maria Teresa Mancuso and Giacomo A.F. D'Agostaro - Cloning of Novel Seven-Transmembrane-Domain Receptors from Rat Olfactory Neuroepithelium

## INTERNATIONAL FELLOWSHIPS

- ❑ Jan Maly - PHOTOSYSTEM II IMMOBILISATION OR THIN FILM DEPOSITION BY CHEMICAL PROCEDURES or - 2 months starting in May 2001.
- ❑ Suna Timur PhD - DEVELOPMENT OF MERCURY THIN FILM (MTF)-BASED SCREEN PRINTED GRAPHITE BIOSENSOR FOR THE DETECTION OF PHENOLIC COMPOUNDS - 4 months starting in September 2001
- ❑ Jan Maly -ORIENTED AND REVERSIBLE IMMOBILISATION OF eENGINEERED MOLECULES ON GOLD ELECTRODES - 4 months starting in May 2002.
- ❑ Suna Timur PhD -PHENOL BIOSENSORS BY MICRORGANISMS OR PURE ENZYMES, 2 months starting in December 2002
- ❑ Jan Maly - ELECTROCHEMICAL DEPOSITION OF SAM LAYERS ON A M-ARRAY OF GOLD ELECTRODES; 5 months starting on September 2003
- ❑ Celine Ndong
- ❑ Anna Krassilnikova

## THESES

- ❑ PATTERNING OF ENGINEERED MOLECULES ON BIOSENSOR MICROARRAYS (R.Pilloton, student Alessandra Volpe)
- ❑ DISPOSABLE BIOSENSORS FOR FOOD, MEDICINE AND ENVIRONMENT  
ELECTROCHEMICAL BIOSENSORS: APPLICATION IN FOOD, ENVIRONMENT AND AGRICULTURE (R.Pilloton - student Eugenia Magaro', April 2003)
- ❑ FUNCTIONAL COATINGS FOR PRINTED SENSORS AND BIOSENSORS (R.Pilloton - student Stefano Marino - 2001 October 21st )
- ❑ PHOTOSYNTETHIC BIOSENSORS FOR ENVIRONMENTAL MONITORING (R.Pilloton - Dr. Livia Della Seta - 2001 July 11th)
- ❑ SCREEN PRINTED ELECTROCHEMICAL BIOSENSORS FOR PESTICIDES IN THE WINE INDUSTRY (R.Pilloton - student Alessio Boni, 2001 November 21st)
- ❑ IMMUNOLOGICAL METHODS FOR ATRAZINE MONITORING (PhD Thesis @ Univ. of Pavia prof.M.Pesavento) - SCREEN PRINTED IMMUNOSENSORS FOR ATRAZINE (R.Pilloton student Flavia Dalla Riva, December 2001)
- ❑ NEURAMINIDASE ACTIVITY DETERMINATION WITH AN ELECTROCHEMICAL LACTOSE BIOSENSOR (R.Pilloton - student Dr.M.R.Montereali - 2001 March 23rd)
- ❑ IMMOBILISATION OF NATURAL AND ENGINEERED MOLECULES FOR NEW BIOSENSORS (R.Pilloton, student Dr.Chiera Di Meo, December 2002)

## PROJECTS

COSMIC (2001-06) was presented at Enea on 2000 March 15th and was evaluated from both an internal and an external commission of experts. It was considered a strategic project at ENEA on December 2000. COSMIC Project started on January 2001. The financial support is exclusively provided from external national and international projects. The following are afferent projects presented or approved.

- BIPES 2001-2003 National Project on Bioelectronics, started on March 2001. Project Leader for ENEA D.Masci
- FIRB PNR 2004-07 "Development of m-analytical systems for biomedical applications". NANOTECNOLOGIE, MICROTECNOLOGIE, SVILUPPO INTEGRATO DEI MATERIALI-Sviluppo di microsistemi multifunzionali per analisi in diagnostica clinica e nel settore alimentare. Fondo Integrativo Ricerca di base (Firb). Started on November 21st 2003. Project Leader for Enea R.Pilloton
- FISR 2003-205 "Optical and Electroptical sensors for rapid control of water body pollutants, started on January 2003 Project Leader for Enea R.Pilloton
- ROSE PROMILK 2001-04 (*RObust Chemical SENSors and biosensor for rAPid on-line identification of fReshly cOLlected MILK*) UE/ENEA n° QLK1-CT2001-01617 "Programma quality of life and management of living resources"; Presented to EEC 5th Framework Quality of Life, started on December 2001 Project leader for Enea R.Pilloton
- CALPARK 2002 Corso di formazione su Sensori e Biosensori a studenti del Parco Scientifico e Tecnologico della Calabria (CALPARK) , October 2002, Project Leader R.Pilloton.
- PROGRAMMA TRIENNALE DI RICERCA AGRICOLA, AGROAMBIENTALE, AGROALIMENTARE, AGROINDUSTRIALE DELLA REGIONE LAZIO 2003-2005 (2° PRAL); PRODUZIONE DI UN PROTOTIPO DI BIOSENSORE PER LA RIVELAZIONE DI ORGANO-FOSFATI, PRESENTI COME CONTAMINANTI DI PRODOTTI AGRO-INDUSTRIALI ED ESTENSIONE DELLA TECNOLOGIA ADOTTATA ALLA PRODUZIONE DI BIOSENSORI PER LA RIVELAZIONE DI MICOTOSSINE, presented on October 2003, Project Leader for Enea R.Pilloton

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