

Minutes of the workshop in Olten (Switzerland, 11th April 2008)

BIODET
**Networking in the application of biosensors to
pesticide detection in fruits and vegetables**



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Information

Place: Hotel ARTE, Riggerbachstrasse 10, CH-4601 Olten, Switzerland

Date and time: Friday 11th April 2008, 09:00 GMT

Agenda

- 0830 – 0900 Registration, Welcome and Snack
- 0900 - 0915 Opening the workshop and project presentation by Willi Glettig
- 0915 - 1045 Participants present their organisations, competencies and interests
- 1045 – 1100 Coffee break
- 1100 - 1200 Status Quo: (Fruit & vegetable needs in pesticide controls, Legislation trends in Europe, State of art of biosensors in agriculture and food production, Biosensor business and potential markets)
- 1200 – 1230 Discussion about status quo
- 1230 – 1330 Lunch
- 1330 – 1400 Summary of EU Calls within FP7 and focus to Biosensors and Food – Agro Applications by Gerhard Gass, Euresearch Head Office, Swiss National Contact Point (NCP). FOOD, AGRICULTURE and BIOTECHNOLOGY
- 1400 – 1430 Future scenario: “What has to be done to create a viable Biosensor industry?”
- 1430 – 1530 Open session to discuss about the Biosensor Research & Development Groups trends and Biosensor Commercial Availability in the market. Formulate strategies that lead to interaction and growth of the chapters. All participants
- 1530 – 1545 Coffee break
- 1545 - 1700 Presentation of future actions by the country chapter leaders and summary

Participants

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Minutes

Taken by Ricardo Diaz

Opening the workshop and project presentation by Willi Glettig

Mr Glettig explained that biosensor industry is 14 years old but the agro-food biosensor industry is still not active. The workshop must be centred in food biosensor application (pesticide detection in fruits and vegetables, including other pathogens such as toxins, allergens and bacteria). We must focus on research, development and commercialisation away from complex laboratory devices towards simple, easy to use and cost-effective devices.

After compiling information related with industrial needs, legislation status and research trends during the first year of the project, Mr Glettig commenced to analyse the market situation and to formulate future strategies for biosensor manufacturers, research centres and universities.

Participants present their organisations, competencies and interests

Ricardo Diaz, head of the Automation and Instrumentation department of Ainia and co-ordinator of the project presented his organisation, the Spanish Food Research Centre AINIA, the interest of Ainia for the technology transfer and innovation of the technology to the food companies, and the real needs that the fruit and vegetable producers have related with the pesticide detection in their products. The main interest in this workshop is to transmit the real needs of this sector to the representatives of European biosensor manufacturers and research centres to dynamize and promote the development of biosensor for this detected gap in the market.

Dr. Jérôme Giovannoni, team leader of Analytical Development and Prod. Chemistry from Syngenta Crop Protection, presented his organisation and the division where he is working: treated seeds and formulations. He showed interest in the field of quantification of pesticides or fungicides in treated seeds and in the use of biosensors for quick checks as an alternative to HC or GC, which are not applicable at field level.

Dr Guy Voirin, Section Head from Biosensing-CSEM (Centre Suisse d'électronique et de microélectronique) explained that his organisation has 350 employees working in technologies such as microbotics or microelectronics. They have developed optical biosensors (refractometry and fluorescence) based on AB. They have also experience in EU projects (Goodfood) in detection of antibiotics in milk and in the development of optical biosensors (Semofs). He showed his interest in the application of biosensors in food in SW and EU.

Prof. Dr. Fabian Fisher, from HES-SO Valais, is working in the University of Applied Sciences Western Switzerland. The Institute of Life Technology is focused on applied research and education. He has a PhD in Chemistry and he is working in food technology and chemical analysis. His main interest is in the development and validation of biosensors.

Prof. Dr. Pierluigi Civera, from the Department of Electronics in the Politecnico di Torino, presented Dr Capputo, who couldn't attend the meeting. Prof. Civera has skills in the electronics field and its application to food. He has taken part in projects applying immunoprobes for food contamination and optoelectronic devices. His main expectations for this workshop are: to know the current state of art of biosensors in the EU, to show this availability to cooperate in research projects with the food sector of Piedmontese. He has also experience in EU projects and National projects focussed in food safety and health. He also represents a spin off company

which the ability of manufacture small series of prototypes with electronics and microfluidic systems.

Dr. Caspar Demuth is the head of the CCS (Center for Chemical Sensors) in the ZHAW (Zurich University of Applied Sciences). This center is working in food technology, biotechnology, chemistry and environmental engineering. They have developed biosensors with different transducers: potentiometric, amperometric, absorbance and fluorescence.. They also have experience in medical applications. Their main interest is in the comparison of new devices with the traditional technologies and in the application of biosensors to process in biotechnology, pharmacy and food and beverages.

Prof. Dr. Ursula E. Spichiger, from C-CIT, presented its company, which develop and produce sensors (capacity sensor for the freshness measurement in olive oil). Her expectations in this workshop are related with the adaptation of biosensors from the research prototypes to the final devices: validation, software and interface development...

Mr. Stefan Spichiger, who has a master in Biotechnology, is the General Manager of CIT (Center for Chemical Information Technology). He commented that he has experience in the development of sensors, instruments and calibration SW.

Dr. Günter Proll representing Prof. Gauglitz -- presented his research group, which is working in spectroscopy and optical technologies for the development of bio and chemosensors. They have experience in research projects related with pesticide detection and other contaminants by means of surface chemistry, reflectometric interference spectroscopy, total internal reflectance spectroscopy...

Prof. Dr Christoph Stamm, working also in the Laboratory of Applied Optics in ZHAW, and is consultant to Prionics AG He has experience in farm animal diagnostics, but also in food and seeds. His main interest is in collaboration in applied research in optical biosensors and new concept of sensors to apply them to the market. He has also experience in EU projects.

Mr. Willi Glettig, CEO of LCC, presented his company as expert and supplier of separation and purification technologies, synthesis of small bioactive molecules e.g. for protein or surface modification with experience in international collaborative projects.

Status Quo: (Fruit & vegetable needs in pesticide controls, Legislation trends in Europe, State of art of biosensors in agriculture and food production, Biosensor business and potential markets)

Willi Glettig asked himself about what happens with public funds for R&D. It goes to support education, basic research and innovation. Unfortunately, there is very little public fund allocated to developing research results into new products.

He made an analysis of the hurdles on the path from science to market. He underlined the importance of taking into account the decision markers in the target market: researchers, farmers, manufacturers and legislators.

Willi explained the product life cycle and explained the differences between bringing a new technology into the commercial domain and participating as a going company in public research.

After that, Willi defined what a biosensor is, and a small discussion related with the difference between a biosensor and a bioassay took place. Then, he showed the main applications of biosensors in food and feed quality and safety, environment, health and veterinary markets.

Willi mentioned who are the market participants and the players in the food chain. At the legislation level, he cited UNO, FAO, WHO, WTO, Codex alimentarius commission, OECD, EU, EFTA & EU associated members...

The EU legislation framework is based on European directive EC 396/2005, so the national regulation is going to disappear with a common legislation for all the European countries.

The European perspective in pesticide residue analysis is different from a global perspective. In Europe we have strong policy related food safety and traceability activities backed with a coordinated Monitoring Programme. At global level, population is increasing, crop production is increasing and crop productivity has to increase also. There is a clear need of new more selective pesticides that are quickly metabolised. Climatic change affects the fungal growth and fosters production of Mycotoxins if not managed properly.

The grower's applying pesticide according the instruction of the suppliers. They don't have analytical tools to precisely dose the pesticides.

There are serious barriers against the use of biosensor, such as the existing standard procedures based on GC, LC and MS and the existing network of testing laboratories in the EU.

Conclusions:

- To be accepted biosensors have to conform to the MRL standard methods
- Research and development has to be focussed on satisfying real market need
- Bringing biosensors in the commercial domain is capital intensive and will for most developer require access to venture capital. Venture Capital require patents as collaterals.
- 93 biosensor commercialisation organisations in Europe but no certified agro-food biosensors yet
- Large amount of public money invested in bioresearch
- Industrial devices and components available, but not certified
- Food safety is a big concern in EU
- Food testing laboratories are not interested in biosensors. They are well equipped with traditional analytical testing equipment including LC/MS, GC et al.
- Growers and food processors need low cost, easy to use and disposable biosensors
- Big interest in a multi-analyte devices
- In Europe there are no known investors (VC or BA Investors) for biosensor production and commercialisation. Danger of brain drain exists.
- European biosensor manufacturers are not organised

Here, a short discussion among all attendants to the meeting was initiated and went on during the lunch time.

Summary of EU Calls within FP7 and focus to Biosensors and Food – Agro Applications by Gerhard Gass, Euresearch Head Office, Swiss National Contact Point (NCP). FOOD, AGRICULTURE and BIOTECHNOLOGY

Gerhard Gass is from the Euresearch Head Office and Swiss National Contact Point in Food, Agriculture and Biotechnology Research for SME's. He presented his organisation, its structure and capabilities. He also presented the work programme of Food, Agriculture and Biotechnology in the VII FP: budget, SME relevant search, international cooperation, thematic approaches... He also showed the draft work programme for 2009 (it will be published in July of 2008 and the deadline will be in January of 2009. Finally, he presented the Strategic Technologic Platform Food for Life and the web address of this STP.

Future scenario: "What has to be done to create a viable Biosensor industry?"

Willi Glettig proposed a common future strategy to dynamize and promote the development and production of biosensors adapted to the real needs of the market:

1. Pan European Network for development of agrifood biosensor industry
2. Market focused R&D
3. Radical breakthrough in agrifood biosensors
4. Certification
5. Financially assisted commercialisation

A Paneuropean Network to be created for researcher developers manufacturers regulators and commercialisers of agro-food biosensors. BIODET to act as umbrella organisation to build and coordinate the evolution of the new agro-food Biosensor Industry. The Network has a holding structure with chapter in key countries managed by a president and a vice-president. There are two memberships as follows:

- researchers and product developers
- manufacturers, certifiers and commercialisers.

Every two years the members decide about location of the head quarter by voting.

Chapter presidents shall evaluate which legal structure for the organisation to be adopted (EEIG, Association, Trust etc.)

An 5 year strategic plan to be established and reviewed every year.

Biodet holding organisation will be responsible for:

- Promotion of the use of biosensors
- Negotiating EU financing
- Coordinating funds distribution
- To attract VC investors for its members.
- To organise an annual conference with members,

Willi has approached Brocher Foundation to sponsor invitation key speakers from governments, politics, universities and industry and to act as host of the inauguration meeting.

It is hoped that Biodet will also act as neutral holders of IPR and to license use of IPR to its members for a licensing fee of 3% based on sale.

Market focussed R&D to include :

- New product R & D project to include definition of target market
- To extend target market to pesticide residues, toxins, allergens and other contaminants
- Research funds has to be aligned with market needs

Here took place a discussion about biorecognition components: antibody (not support research), DNA-probes (future line), enzymes (years and years of research)...

The agri-food supplier and food processor market comprises many SMEs. Some of them are financially controlled through large holding organisation or cooperatives e.g. Nestle, BT etc. Industry structures comprising of large monolytic, vertically integrated multinational companies as we know it from the pharmaceutical industry is most probably not practical for the agri-food sector. We assume that the ideal structure for a future agro-food biosensor industry will comprise of a number of specialised SMEs that collaborate with each other. Every SME will dominate one or two applications world wide.

Aims and hopes to be pursued:

- To map path to certified agri-food biosensors in collaboration with EC
- To reach European leadership in agro-food biosensors by 2010.
- To generate radical breakthrough innovation
- To fully understand the enduser requirements and to create product concepts that satisfy these requirements (Potential users have 3 motives to procure testing devices
- To have 5 to 10 agro-food Biosensors manufactured with QMS spread all over Europe.

To enhance formation of an agri-food biosensor industry biodet should assist by means of:

- To place regularly interesting articles about application of biosensor to the general media
- To inform the financial press about the agri-food biosensor industry and its achievement.
- To include EC in the industrial development process.

Open session to discuss about the Biosensor Research & Development Groups trends and Biosensor Commercial Availability in the market. Formulate strategies that lead to interaction and growth of the chapters. All participants

Pierluigi: The Network is opened to everybody in Europe? Is the target market perfectly defined? Which is the technology to avoid? What are the detection limit?

Ricardo: Of course the Network is opened to everybody accomplishing the criteria of the project (website is opened, and the invited people to the meeting has been selected aster a search inside the project with the most representative stakeholders in Europe).

The initial target market was fruit and vegetable producers, but as we have seen that this is a limited market. For commercial feasibility reasons our intention is to create a wide the target market including pesticide residues, Mycotoxins, allergens, bacteria and other agri-food contaminants

The best technology depends on the application, but in general optical biosensor applications are more usual due to its performance, easy automation and lower price.

Detection limit working with specific antibodies is very high: greater than 1 ppb in some cases.

Günter: There are existing networks in Germany related with chemistry analytics and EoN related with Food Safety.

Ricardo: BIODET must be in contact with other generalist networks to share information with them, of course.

Stefan: Why are there no commercial biosensors available? Which is the best device for a SME? A biosensor or a disposable dipstick test (similar to the pregnancy test)?

Ricardo: There are several biosensors available in the market, even in pesticide detection, but the commercial available solutions don't satisfy the industrial requirements. In general, new devices have to be easy to use, cheap, fast and multi-analyte to be applied with more than one product-residue combination.

A disposable dipstick test can be useful in some applications, but in general the accuracy is quite limited and the determination is qualitative (not quantitative).

Jerome: who are the drivers of the food-agriculture sector?

Ricardo: Mainly big retailers and distribution companies with very big networks of supermarkets.

Presentation of future actions by the country chapter leaders and summary

Willi: To get the ball rolling we need partners in the key countries to find potential members. The following participants agreed to help establishing the network:

- Ursula: Targeting manufacturers and researchers in Switzerland
- Pierluigi and M. Mascini : Targeting researchers and developers in Italy
- Günter: Targeting researchers in Germany
- Ricardo: Targeting final users in Spain
- Guy: Targeting researchers in Switzerland and will contact potential chapter partners in France
- GS Marketing (SP): Targeting final users in Spain

Ricardo: Special section in the website will be created with the information of the workshop, the presentations and the information about the network.

Willi: To complete application and submission to Brocher Foundation.

Willi: Thanks everybody for attending the meeting, for their interest and their active participation.