

# Towards an European Integration in Nanobiotech: Nano2Life



Fig. 1: European map with location of the partners of Nano2Life

160 scientists and managers from 12 European countries but also from Canada and Australia have attended from the 2<sup>nd</sup> to the 5<sup>th</sup> of February 2004 near Grenoble (French Alps) the kick-off meeting of the first European network of excellence in nanobiotechnology supported by the European Commission. This working event of four days represents the starting date of a significant breakthrough in the European organisation of research in the field of application of micro and nanotechnologies into life sciences. 23 public or non profit organisations have agreed on the progressive integration of part of their activities in the various fields related to nanobiotech. A joint programme of activity plans a set of workpackages and tasks for the next 4 years, paving the way towards an European Institute of Nanobiotechnology.

## From Some Isolated Programmes to a Joint Initiative

The network of excellence is one of the three new instruments introduced for FP6, driven by the concepts of the European Research Area (ERA) and also characterised by the structuring and integrating effects that they will have on

European research. A network of excellence is a "multipartner project aimed at strengthening excellence on a research topic by networking the critical mass of resources and expertise. This expertise will be networked around a joint programme of activities aimed primarily at creating a progressive and lasting integration of the research activities of the network partners while, at the same time advancing knowledge on the topic" [1]. Nanobiotechnology has been identified as a key topic to be supported by the European Commission under the FP6: "Europe needs to support research into the integration of biological and non-biological systems, opening new horizons in many applications, such as for processing and for medical and environmental analysis systems" [1].

The answer of some leading organisations in the field to this call issued by the European Commission has been crystallised into Nano2Life, the first successful network of excellence in nanobiotech, favourably reviewed and funded by the European Commission. The main commitment of the top management of these partners relies on the progressive integration of some of their activities with a durable commitment of their human,

financial and technical resources towards an integrated European Institute of Nanobiotech.

Nano2Life, this newly born network, therefore is the first step to merge existing European expertise and knowledge in the field of nanobiotechnology in order to keep Europe as a competitive partner of the US and Asia and to make it a leader in nanobiotechnology transfer in 4 years time. Nano2Life is tackling fragmentation of European nanobiotech by joining 23 so far unconnected dynamic, highly specialised and competent regions and centres with experience in initiating and running nanobiotech programmes (Fig. 1). Nano2Life aims to set the basis of a virtual European Nanobiotech Institute, focused on the understanding of the nanoscale interface between biological and non biological entities, and its possible application in the area of complex and integrated novel sensor technologies, for health care, pharmaceuticals, environment, security, food safety, etc.

## Integration is not Restricted Only to Research

The integration of so many different organisations is not an easy goal. There-

fore the partners have agreed on a Joint Programme of Activity (JPA) designed:

- To develop joint research projects in 4 major technical platforms: functionalisation, handling, detection, integration of devices
- To elaborate a joint IPR policy with a special focus on SMEs
- To develop novel education and training with special emphasis on the scientific community of the candidate countries
- To build a future common RTD platform with shared facilities, knowledge, methods, electronic communications and integrated management.

Multi media supported communication and dissemination activities will provide thorough education and awareness of the scientific and industrial community outside of Nano2Life and the general public about the impact of nanobiotech on industry and society. This will ensure development of nanobiotech devices, material and services according to the needs of European industry and in agreement with international social and ethical standards, which will support sustainable development of the European economy in this knowledge intensive area.

Nano2Life addresses the future need for increasingly efficient, more targeted and less invasive analysis systems for health care or environmental monitoring. They are expected to bring innovative re-

search tools and industrial high-added value in the form of eco-efficient and sustainable devices to biotechnology, the pharmaceutical industry and health care. These innovations expected to result from the joint research projects will be based on a multidisciplinary “vertical” approach combining life sciences, micro- and nano-technologies, material sciences, physics and chemistry. The connection of education and skills development with these research activities will ensure dissemination and increased knowledge about these nanobio-devices, and will spread their implementation in the S&T industrial sector as well as their use by end-users like medical doctors.

Among the ten domains of activity (so called “workpackages”) identified by the consortium, the four basic ones are designed to:

- Implement a Joint Research Programme to bring innovative research and to overpass existing bottlenecks
- Implement an Education & Training scheme, connected to the needs identified by the Joint Research Programme
- Connect technical and human resources required for the implementation of the joint research projects and also for supporting the training programme
- Communicate and disseminate the results of the network, of its programme of activity and support public discussion and awareness of the benefits/limits of nanobiotech

Nano2Life is not only focused on academic research but is also taking care of technology transfer and cooperation with industry to make easier the transfer of nanobiotech from academia to industry and then to the end users. Therefore, three boards strongly connected to the 21 associate industrial members, are taking care of the various aspects linked to the present or future industrial applications of nanobiotech:

- The foresight and strategy analysis
- The industrial cooperation policy
- The IPR policy

Due to the numerous potential questions raised by the design or the use of nanotechnologies in biology and life sciences, an Ethics Board has been set up to address these key issues.

Last but not least, two horizontal activities are dealing with the project management and the gender action plan.

The 10 activities of the network try to cover all aspects related to the development and the implementation of nanobiotechnologies. Therefore Nano2Life is significantly different from the previous thematic networks under FP5, with its broader ambition in terms of integration of existing expertise and resources.

### The Pioneering Partners

The nanobiotech scientific community is nowadays fragmented and scattered in Europe as well as in other advanced

Table 1: Existing nanobiotech programmes by partners

Partners	Scientists involved	Annual budget (K€)	Starting date	Identified programme
CEA	130	19 500	1995	“Biopuces”(1995) then “NanoBio”(2001)
CNRS	70	9 000	1992	
Inserm	31	3 875	2000	
Uni Muenster	70	8 800	2000	
Bioanalytik	1	-		No research programme
Uni Saarland	20	1 500	1998	
Uni Kaiserslautern	23	1 070	2002	Nano+Bio Center at K-Tech
Uni Mainz	50	4 000	1995	
NanoBioNet	2	-		No research programme
PCB	32	1 280	2001	Nanobioengineering
Lund	30	3 000	1986	
FORTH	24	2 200	1995	
Demokritos	8	300	1996	
JRC	20	1 000	2003	Nanobiotechnologies for Health
MIC	30	2 400	2000	
NMRC	22	2 800	1999	ICT/BIO
EPFL	100	12 500		
Tel Aviv	15	250	2000	
Mesa+	60	1 200	2000	Nanolink then Bionanotechnology
INSAT	100	9 600	1998	Institute for Nanoscale Science & Technology
Centech	1	200	2001	
Fraunhofer IBMT	20	2 800	2001	
FSRM	2		1994	Courses on microfluidics, mTAS, nanotechnology and biomedical applications

Table 1: Resources by partners invested in nanobiotech programmes

regions of the world. The situation is very similar for industry where the limited number of companies with activities in nanobiotech is mainly made of high tech Small and Medium size Enterprises (SMEs), usually spin-offs from academia. Some of the reasons explaining this are:

- Nanobiotech is at the interface between two worlds: "nano" and "life sciences"...and by consequence, none of these community seems legitimate to be the only scientific flag carrier
- A lot of disciplines are required in nanobiotech: physics, chemistry, biology, modelling, technology ...
- There was no learning society dedicated to nanobiotech until recently
- There were (but it's no longer the case!) very few international conferences in Europe focused on nanobiotech (Nanobiotech Conference, Münster, Germany; Nanobiotechnologies, France).

In this fragmented context, the opportunity offered by the European Commission under the FP6 to initiate a network of excellence as a first step towards a long lasting integration within the frame of the new ERA was unique and enthusiastic!

The partnership of Nano2Life relies on two groups of organisations:

- 13 organisations are already associated into 5 regional clusters like Oeresund (Denmark and Sweden), Bioanalytik-Muenster (Nordrhein-Westphalia), NanoBioNet (Saarland-Rheinland-Pfalz), NanoBio (Rhône-Alps) and PCB (Catalunia).

These organisations are experienced in developing multidisciplinary and multi-organisations projects or programmes in nanobiotech, within a regional framework. They represent the backbone of Nano2Life as they act as regional spreaders about recent developments in nanobiotech.

- 10 organisations are centers of excellence, located all over Europe, with a recognised research programme in nanobiotech. They bring their specific expertise in the complementary fields required by the nanobiotechs.

The resources invested by the partners in their programme in nanobiotech amounts to 870 scientists and about € 87 millions per year (Tab. 1). So this partnership represents a significant part of the European scientific community in nanobiotech (Sweden, Denmark, Germany, United Kingdom, Ireland, France, Spain, the Netherlands, Italy, Greece, Switzerland, and Israël).

Besides the above mentioned founding partners, some other organisations are associated to the network. 23 industrial companies, 5 organisations from Associate Candidate Countries (Romania, Slo-

venia, Bulgaria, and Hungary) and 4 international reference centres located outside Europe (Canada, South Korea, Australia) are thus entitled to participate to the Joint Programme of Activity of Nano2Life. The only restriction compared to the full partners is that they are not eligible for receiving part of the EC support granted to the network and don't participate to the various management boards.

## Conclusions

Nano2Life is the first experience at such a large scale, to integrate research organisations as well as industry and agencies, in the field of nanobiotech. This network of excellence seems a very valuable tool to tackle the existing fragmentation in Europe and to prepare a long lasting integration of some of the major European players in nanobiotech. As the model of network of excellence was unknown until recently, the daily implementation of Nano2Life is not an easy task but the energy and dynamism of the most committed organisations represent the best asset to achieve this very ambitious goal.

## Acknowledgment

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## References

- [1] From Cordis web site: [www.cordis.lu/fp6/instruments-print.htm](http://www.cordis.lu/fp6/instruments-print.htm)
- [2] The European Federation of Biotech has launched a dedicated section on nanobiotech in December 2003 ([www.efbweb.org](http://www.efbweb.org))

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