PHANTOMS FOUNDATION
ANNUAL REPORT 2004

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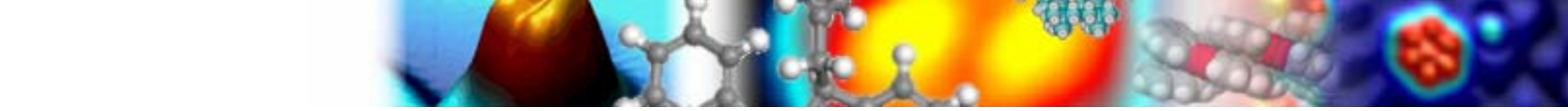

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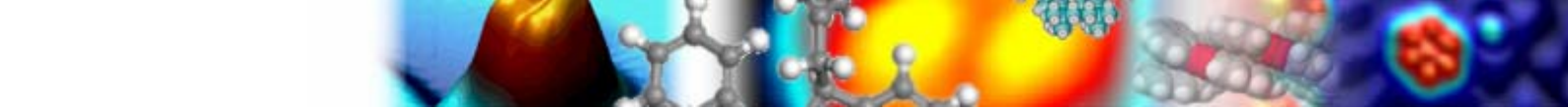


1 FOREWORD

Welcome to the first annual report from the Phantoms Foundation. This non-profit Institution, founded in Madrid (Spain) on November 26, 2002 has experienced a rapid development since its inauguration and was established with the aim of providing high level management to National and European scientific projects focusing in the area of Nanoscience & Nanotechnology.

The Phantoms Foundation focuses its activities on Nanoscience / Nanotechnology and in particular Emerging Nanoelectronics and is a key actor in structuring and fostering European Excellence and enhancing collaborations in these fields. This non-profit association is also playing an important role as a dissemination platform in national and 6th framework program European funded projects to spread excellence among a wider audience and to help in forming new networks.

Our goals are i) to provide an innovative platform for dissemination, transfer and transformation of basic nanoscience knowledge; and ii) to strengthen interdisciplinary research in nanoscience and nanotechnology and catalyse collaboration among international research groups to favour the emergence of new joint project proposals.

To achieve these goals, the Phantoms Foundation is working in close collaboration with Spanish and European Governmental Institutions and the European Commission.
Apart from the staff contractually linked to Phantoms Foundation, we are fortunate to count with the collaboration of a significant number of internationally renowned scientists from different public and private institutions. They participate actively in the activities of the foundation and more importantly, they provide their input as consultants and advisors to ensure the quality of the activities of Phantoms Foundation.

The mission of Phantoms Foundation is mainly based on three equally important types of activities, covered in separate chapters in this report:

- Conferences/Workshops
- European Projects
- Reports

Phantoms Foundation has been successful in attracting grants and new projects in 2004 (NaPa Integrated Project, TNT2004 conference, 1st NanoSpain Workshop, FECyT, etc.) allowing to continue a strong development by enlarging its activities.

Antonio Correia
President

2 CONFERENCES

2.1 1st NanoSpain Workshop

10-12 March 2004
San Sebastián, Spain
http://www.nanospain.org/Workshop1/index.htm

During the last two decades, a revolutionary scientific new age, based on the capacity to observe, characterize, manipulate and organize matter in the nanometric scale, has been appearing. In this scale, physics, chemistry, materials science, computational theory, and engineering converge towards the same theoretical principles and experimental findings that are basically governed by the laws of the Quantum Mechanics. Nanotechnology involves these interdisciplinary knowledge areas and methodologies in order to study, manufacture and characterize functional structures with dimensions of tens of nanometers.

The three year-old NanoSpain network aims to agglutinate and coordinate the efforts made in the field of the Nanotechnology by Spanish groups from universities, research institutes and companies. Moreover, this network has tried to help governmental institutions in defining potential actions and plans referring to this area. Actually the NanoSpain network, comprising 116 Spanish groups with near 400 researchers in total, is one of the widest Spanish scientific networks.

As a direct and most effective way to enhance the interaction between network members, a meeting of NanoSpain affiliates was organised. We wanted to create a stimulating working environment in which faculty, students, staff and administrators were free to share ideas and ask questions, to discuss what they have done and want to do in their programs, what worked, what didn't work, and what resources have been used and which ones will be needed in the future.

The first NanoSpain conference was held at the "Miramar Palace" in San Sebastian (Spain), from March 10-12, 2004. There were 207 registered participants. This workshops was organized by Phantoms Foundation in collaboration with the Spanish National Research Council, Donostia International Physics Center (DIPC) and Universidad del País Vasco.

1st NanoSpain Workshop at a glance

- 207 Participants from 10 different countries
- 10 Keynote lectures
- 36 Oral presentations
- 95 Poster presentations
- One exhibitor

The main objective of the conference was to facilitate the dissemination of knowledge and to promote interdisciplinary discussions among the different NanoSpain groups. In order to organise the various sessions and to select contributions, the meeting was structured in several thematic lines, although interactions among them were promoted. To emphasise the link between basic and applied research, the company Scientec presented its nanotechnology-based products at this 1st NanoSpain Workshop.

1st NanoSpain Workshop Exhibitor

SCIENTEC

A second objective of the meeting was to evaluate the situation of Nanotechnology in Spain in general, and the future directions of the NanoSpain network, to guarantee its continuity by means of concrete proposals and a renovation of its structures.

There were a total of 207 participants that contributed 10 keynotes, 36 orals and 73 poster presentations, respectively. The main topics discussed at this conference were MEMS/NENS, Nanobiology, Nanochemistry, Nanoelectronics, Nanomaterials, Scanning Probe Microscopies (SPM), Scientific policy and infrastructure, and Simulation at the nanoscale.

Keynote lectures

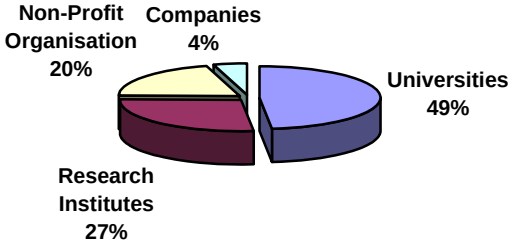
1. **Robert Baptist** (France)
2. **Johannes Barth** (Switzerland)
3. **Juergen Brugger** (Switzerland)
4. **Roberto Cingolani** (Italy)
5. **Mervin Myles** (UK)
6. **Bibiana Onoa** (USA)
7. **Sophia Yaliraki** (UK)
8. **Yoshiji Horikoshi** (Japan)
9. **Patrick Van Hove** (Belgium)
10. **Jose Luis Viviente** (Belgium)

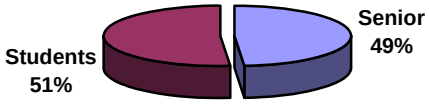
Participants per Country

Spain	191
Austria	1
Belgium	2
France	4
Italy	1
Japan	1
Portugal	1
Switzerland	2
United Kingdom	2
USA	2
TOTAL	**207**

Spanish scientists represented 92% of participants.

This conference provided a forum for graduate students, junior and senior researchers to discuss and reflect on the status of the Nanotechnology and Nanoscience in Spain. From the more than two hundred participants brought together by the conference, more than one hundred were graduate students. This represented 51% of the total number of participants. For many the conference offered the first chance to present their work in such a public arena, and so was a key rite of passage, as well as an important training opportunity. Universities, research institutes, non-profit organisations and companies from ten different countries were represented at NanoSpain.





This event received funding from the "Donostia International Physics Center" (DIPC) and the Spanish Ministry of Science through the following two networks:

- "Red Española de Nanotecnología (NANOSPAIN)", funded by Ministerio de Ciencia y Tecnología - Acción Especial MAT2001-5411-E.
- "Red Nacional de Investigadores en Nanociencias: Metodologías Experimentales y Teóricas (NANOCIENCIA)", funded by Ministerio de Ciencia y Tecnología - Acción Especial PGC2000-2586-E.

2.2 VIIIth European Conference on Surface Crystallography and Dynamics (ECSCD8)

18 - 21 July 2004
Segovia, Spain
http://www.phantomsnet.net/ECSCD8/

The conference was hold in Segovia, a UNESCO World Heritage City, at the "Monasterio de Santa Cruz la Real" on the SEK University Campus.

This conference was the eighth in a series of international meetings focusing on the atomic-scale structure at clean and adsorbate covered single-crystal surfaces. In 2004 the conference was broadened to explicitly include the diffusion dynamics at crystal surfaces and the relation between dynamics and structure.

Some of the topics covered included mainstream surface work on oxides, surface alloys, surface stress, surface thermodynamics, self-assembled systems and nanostructuring, magnetic surfaces, surface engineering, surface imaging. As expected, a number of both theoretical and experimental studies (*ab initio* calculations, DFT, quantitative LEED, real time STM, FIM, AFM, etc.) were presented by several scientists, very experienced in the field. As in previous conferences, internationally highly reputed invited speakers and young "rising stars" participated with the same enthusiasm.

ECSCD8 at a glance

- 122 Participants from 20 different countries
- 19 Keynote lectures
- 28 Oral presentations
- 62 Poster presentations
- 7 student grants
- One exhibitor

The conference was organized by Phantoms Foundation, in close collaboration with Universidad Auntónoma de Madrid (UAM), Universidad SEK and Consejo Superior de Investigaciones Científicas (CSIC). The Ministerio de Ciencia y Tecnología and the Junta de Castilla y León sponsored the event, and the Spanish nanotechnology company Nanotec exhibited its equipment at the conference site.

ECSD8-2004 Exhibitors

NANOTEC ELECTRONICA

ECSCD8 counted with a panel of twelve international experts that acted as advisory board. This meeting gathered 120 participants, among them 19 were invited speakers, 28 contributed oral presentations and 64 presented their work in the form of a poster.

Keynote lectures

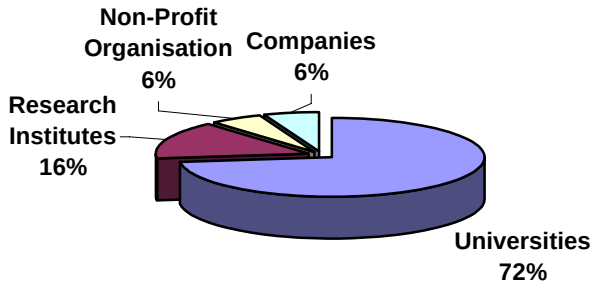
1. **Esther Barrena** (Germany)
2. **Johannes Barth** (Switzerland)
3. **Harald Brune** (Switzerland)
4. **Giovanni Comelli** (Italy)
5. **Olivier Fruchart** (France)
6. **Jose María Gomez** (Spain)
7. **Jay Gupta** (USA)
8. **Nobert Kruse** (Belgium)
9. **Helene Magnan** (France)
10. **Elena Mena-Osteritz** (Germany)
11. **Stefan Müller** (Germany)
12. **J.E. Ortega** (Spain)
13. **Rubén Pérez** (Spain)
14. **Philip Sautet** (France)
15. **Andreas Schmid** (USA)
16. **Michael Schmid** (Austria)
17. **Svetlozar Surnev** (Austria)
18. **Geoff Thornton** (UK)

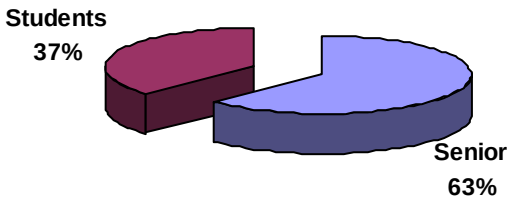
Participants per Country

Austria	6
Belgium	1
Canada	1
Denmark	3
Finland	1
France	8
Germany	28
Italy	9
Japan	3
Korea	1
Lithuania	1
Mexico	1
Netherlands	2
Slovenia	1
Spain	41
Sweden	1
Switzerland	3
Taiwan	2
United Kingdom	6
USA	2
TOTAL	**122**

Spanish scientists represented 33% of participants.

As part of a conscious effort made by Phantoms Foundation to allow students performing graduate work to present a contribution at the "8th European Conference on Surface Crystallography and Dynamics", seven travel grants were awarded to students from France, Germany, Spain, Canada and Italy. It is important to mention that thirty-seven per cent of the ECSCD8 participants were graduate students affiliated to doctorate programmes.





2.3 Ultimate Lithography and Nanoengineering Devices (LITHO2004)

13 - 16 June 2004
Agelonde, France
http://www.lithoconf.com/LITHO04

LITHO 2004 took place in Agelonde (France) from 13-16 June 2004. In addition, EU project reviews and Working Groups corresponding to the 14th NID Workshop were organised in parallel with this "Ultimate Lithography and Nanodevice Engineering" conference.

The general purpose of this workshop was to gather researchers interested in the design and fabrication of nano-devices. The association of researchers working in theory, design/modelling and on ultimate lithography processes (top-down, bottom-up and coupling of both techniques) was an opportunity for fruitful discussions. A full day presentation, organised in collaboration with PHANTOMS network was devoted to speakers from private companies, IC producers and equipment suppliers. Seven keynote speakers were invited to participate in this “Industrial Day”.

LITHO2004 at a glance

- 111 Participants from 20 different countries
- 23 Keynote lectures
- 32 Oral presentations
- 14 Poster presentations
- 10 student grants
- 8 exhibitors

The rationale to organize this conference arose from the 2003 ITRS microelectronic roadmap. This report presented a rather clear vision of the near future of microelectronic technology within about ten years. Beyond this date, the MOSFET channel should be shrunken down to 20 nm, a size that is very close to its critical length. Thus to keep on scaling down, microelectronic industry will be up against MOSFET replacement by another elementary component. The far future technology is still open from both point of views of component and fabrication processes. Concerning the short term future of microelectronics, a 'red brick wall' planned in 2006 on Moore's graph: beyond this year there are no known solutions for most technical areas and essential research breakthroughs are needed.

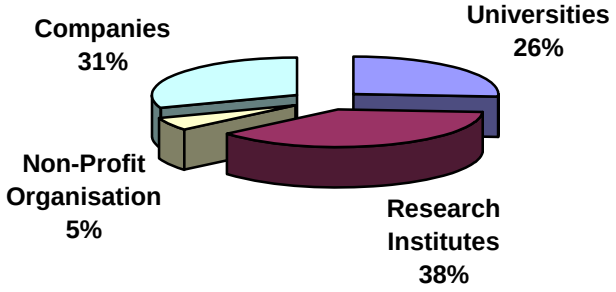
LITHO 2004 Exhibitors	
Axess Tech	Molecular Imaging
SCIENTEC	obducat
NANOSOLUTIONS by ORSAYPHYSICS	SÜSS MicroTec
Veeco	ZEISS

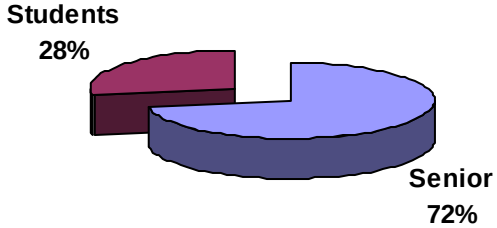
A great effort has been devoted this last decade to design and modelling of electronic devices based on quantum effects as alternative solutions for MOSFET replacement in memories. Several ideas were emerging such as molecular switches, single electron devices, etc. In all cases, the fabrication of the key part of the device requires a lithography step with a resolution at sub-10 nm scale. If direct writing lithography processes (top-down approaches) are very promising technologies for demonstrator fabrication, the mass production should undoubtedly rely on self-assembly techniques (bottom-up approaches). In all cases one of the major bottleneck in research development remains in demonstrator fabrication since no technology is presently available for addressing an individual function associated to a nano-object (nano to micro bonding).

Topics of interest for the conference were, in the area of Ultimate Lithography: EUV, SPM Lithography, E-beam Lithography, Ion-beam Lithography, Nanoimprint, Self-organisation, Bottom-up and Nanoinstrumentation. And in the field of Nanodevices: Quantum Dot and Nanowire Devices, Single Electronics, Nanoelectronics, Molecular Electronics and Bio-inspired Devices

LITHO2004 was organized by Phantoms Foundation in collaboration with CRMC-N and LETI. Funding was provided by PHANTOMS Network, Information Society, Atmel, Orsay Physics, AxessTech, Omicron and Raith.

Ten graduate student received travel bursaries to cover their travel expenses.





Keynote lectures

1. **Marc Bescond** (France)
2. **Jean-Philippe Bourgoin** (France)
3. **Jurgen Brugger** (Switzerland)
4. **Ricardo Garcia** (Spain)
5. **Daniel Henry** (France)
6. **Xavier Jehl** (France)
7. **Christian Joachim** (France)
8. **Victor I. Klimov** (USA)
9. **Shinji Matsui** (Japan)
10. **Androula Nassiopoulou** (Greece)
11. **Dietmar Pum** (Austria)
12. **Juan José Saenz** (Spain)
13. **Clivia Sotomayor Torres** (Ireland)
14. **Patrick Van Hove** (Belgium)
15. **Christophe Vieu** (France)
16. **Mark Welland** (UK)
17. **Michael Despont** (Switzerland)
18. **Mart Graef** (The Netherlands)
19. **Johannes Kretz** (Germany)
20. **Pierre Legagneux** (France)
21. **Herve Rivoal** (France)
22. **Yasuo Takahashi** (Japan)
23. **Thorsten Wahlbrink** (Germany)

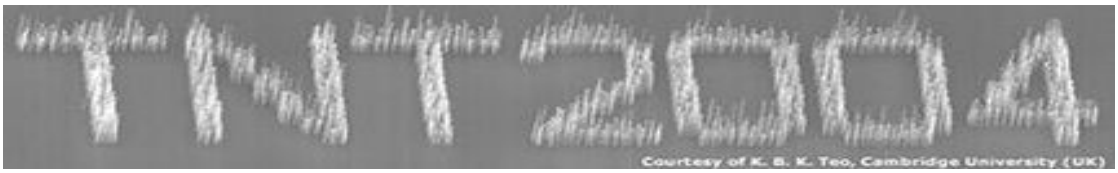
Participants per Country

Australia	1
Austria	3
Belgium	4
Czech Republic	1
Denmark	3
Finland	1
France	55
Germany	13
Greece	1
Ireland	2
Israel	1
Italy	2
Japan	2
Netherlands	2
Russia	1
Spain	10
Sweden	1
Switzerland	4
United Kingdom	4
USA	3
TOTAL	**111**

French scientists represented 49% of participants.

2.4 Trends in Nanotechnology (TNT2004)

12 -17 September 2004
Segovia, Spain
http://www.phantomsnet.net/TNT04/



During the past few years many international and regional conferences have emerged in response to the growing awareness of nanotechnology as a key issue for the future of scientific and technological development. Among these, the conference series “Trends in Nanotechnology” (Toledo, Spain, 2000; Segovia, Spain, 2001; Santiago de Compostela, Spain, 2002 and Salamanca, Spain, 2003) has become one of the most important meeting points in the nanotechnology field: it provides fresh ideas, brings together well-known speakers, and promotes a suitable environment for discussions, exchanging ideas, and enhancing scientific and personal relations among participants.

As a crucial aid for this task, Phantoms foundation was chosen by the TNT2004 organising committee to carry out all the management activities and to design and maintain a web page for the conference.

TNT2004 was organised in a similar way to the four previous TNT conferences, with an impressive scientific programme covering a wide spectrum of nanotechnology research. The conference took place in Segovia (Spain), September 12-17. No parallel sessions are hold at TNT and this structure provided such as in previous years an opportunity for broad interaction.

TNT2004 at a glance

- 367 Participants from 33 different countries
- 45 Keynote lectures
- 35 Oral presentations
- 236 Poster presentations
- 64 student grants
- 22 poster awards
- 8 exhibitors

The aim of the conference was to focus on the applications of nanotechnology and to bring together, in a scientific forum, various worldwide groups belonging to industry, universities and government institutions. TNT2004 was particularly effective at transmitting information and establishing contacts among workers in this field.

The TNT presentations were categorised in the following major topics:

- Nanofabrication
- Measurements/characterization at the nanoscale
- Carbon nanotubes
- Quantum dots and wires/Electron transport phenomena
- Bio-nanotechnology
- Nanomagnetics/spintronics
- Nanomechanics, e.g nanotribology, nanofluidics etc
- New quantum phenomena, e.g. quantum computing
- Modeling at nanoscale

TNT2004 was the successful consequence of a coordinated effort from several institutions. We are indebted to the following institutions, companies and government agencies for their financial support: Consejo Superior de Investigaciones Científicas (CSIC, Spain), NIMS Nanomaterials Laboratory (Japan), Universidad Autónoma de Madrid (UAM, Spain), Ministerio de Ciencia y Teconología (Spain), iNano (Denmark), Universidad SEK (Spain), IRC in Nanotechnology/ University of Cambridge (UK), Universidad Carlos III de Madrid (Spain), Purdue University (USA), U.S. Office of Naval Research Global (USA), Donostia International Physics Center (DIPC, Spain), Sociedad de Microscopía de España (SME, Spain), Advanced Industrial Science and Technology (AIST, Japan) , Nanotechnology Research Institute (NRI, Japan), Phantoms Foundation (Spain), Diputación Provincial de Segovia (Spain), Junta de Castilla y León (Spain), Nanonet (UK), Air Force Research Laboratory (USA), NASA (USA), Parc Cientific de Barcelona (PCB, Spain), PHANTOMS Network/ European Commission (IST/FET Program), IEEE (USA), Motorola (France), NSERC CRDNG (Canada), Imperial College Press (UK) and World Scientific (Singapore).

A list of all institutions involved in the organisation of the TNT conference series up to now, is provided below:

Institution	Country	Times involved in the Organising Committee	Year				
			00	01	02	03	04
Univ. Autónoma de Madrid	Spain	5	■	■	■	■	■
Univ. Complutense de Madrid	Spain	5	■	■	■	■	■
CSIC	Spain	5	■	■	■	■	■
University of Cambridge / IRC	UK	5	■	■	■	■	■
Purdue University	USA	4		■	■	■	■
Universidad Carlos III Madrid	Spain	4		■	■	■	■
CMP Científica S.L.	Spain	4	■	■	■	■	
Georgia Tech	USA	3			■	■	■
NIMS	Japan	2				■	■
NRI	Japan	2				■	■
Universidad de Salamanca	Spain	2				■	■
Univ. Santiago de Compostela	Spain	2			■	■	
Universidad SEK	Spain	2		■			■
IBM	Switzerland	1	■				
Phantoms Foundation	Spain	1					■
IEEE	USA	1					■
SRC	USA	1				■	
Univ. Castilla la Mancha	Spain	1	■				
TOTAL INSTITUTIONS			**7**	**8**	**9**	**13**	**13**

In 2004, a total of 367 scientists from 33 different countries attended this event and contributed more than 80 talks, 236 posters, and many stimulating discussions about their most recent research. The programme included forty-five keynote lectures (30 minutes) and thirty-five oral presentations (15 minutes).

Keynote lectures

1. **Masakasu Aono** (Japan)
2. **Jean-Philippe Bourgoin** (France)
3. **Juergen Brugger** (Switzerland)
4. **Enrique Calleja** (Spain)
5. **Federico Capasso** (USA)
6. **Hai-Ping Cheng** (USA)
7. **Mei-Yin Chou** (USA)
8. **Ken Dean** (USA)
9. **Georg S. Düsberg** (Germany)
10. **Andreas Engel** (Switzerland)
11. **Albert Fert** (France)
12. **F. Javier Garcia de Abajo** (Spain)
13. **Peter Gruetter** (Canada)
14. **L. Jay Guo** (USA)
15. **Tomihiro Hashizume** (Japan)
16. **Anwar Hasmy** (Venezuela)
17. **Andy Henson** (UK)
18. **Christian Joachim** (CEMES/CNRS, France)
19. **Krishna Kalyanasundara** (USA)
20. **Phil Kuekes** (USA)
21. **Young Kuk** (Korea)
22. **Gerhard Meyer** (Switzerland)
23. **Mervyn Miles** (UK)
24. **Eiichi Nakamura** (Japan)
25. **Roberto Otero** (Denmark)
26. **Danny Porath** (Israel)
27. **Edward Rashba** (USA)
28. **Mathis Riehle** (UK)
29. **Stephan Roche** (France)
30. **Frank Scheffold** (Switzerland)
31. **Ivan K. Schuller** (USA)
32. **Alexander Shluger** (UK)
33. **Robert Shull** (USA)
34. **Clivia Sotomayor** (Ireland)
35. **Joachim P. Spatz** (Germany)
36. **Erio Tossati** (Italy)
37. **John Tucker** (USA)
38. **Masaru Tsukada** (Japan)
39. **Daniel Ugarte** (Brazil)
40. **Patrick Van Hove** (Belgium)
41. **Mark Welland** (UK)
42. **Stuart Wolf** (USA)
43. **Noboru Yamazaki** (Japan)
44. **Constantine Yannouleas** (USA)
45. **Hiroshi Yokoyama** (Japan)

Participants per Country

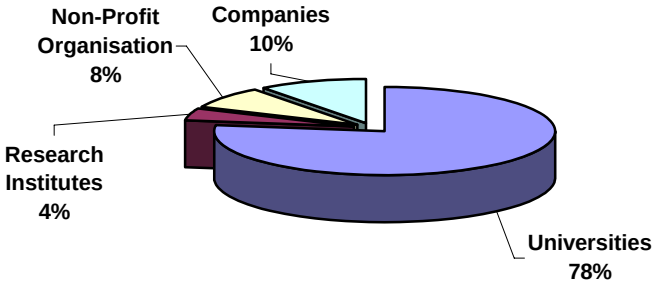
Spain	117
United States	36
United Kingdom	29
Canada	28
France	20
Switzerland	20
Japan	15
Italy	13
Germany	11
Denmark	8
Korea	8
Netherlands	8
Finland	7
Russia	7
Ireland	6
Brazil	5
Belgium	4
Sweden	3
Venezuela	3
Australia	2
Iran	2
Israel	2
Mexico	2
Poland	2
Chile	1
Estonia	1
Latvia	1
Lithuania	1
New Zeland	1
Singapure	1
Slovenia	1
South Africa	1
Taiwan	1
TOTAL	**367**

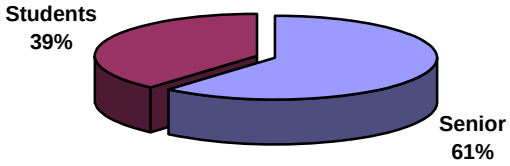
Spanish scientists represented 32% of the participants.

Regarding the distribution, 10% of the attendees belonged to companies (IBM, Motorola, Keithley Instruments, Philips, etc...), whereas the rest was affiliated to different universities and research institutions (CNRS, CSIC, etc.).

Graduate students attending conferences such as TNT learn to understand the importance of interdisciplinary skills in facilitating their future lines of research. And that is why TNT conference series is committed to provide financial support to allow students actively pursuing a PhD to attend the conference. In 2004 sixty-four graduate students received a travel grant from NASA, ONRIFO, IRC, iNANO, SME, NSERC/CRSNG, EU PHANTOMS

Network or TNT organisation. This allowed them to attend and present their work at TNT2004.





The TNT series represents a fantastic opportunity for companies to interact with potential customers and for scientists to find out about the latest technical innovations on the field. That is the reason why TNT offers to a selected number of companies the possibility to have an exhibition booth to present their novelties. This exhibition runs in parallel with the conference. At TNT2004 seven companies from 5 different countries participated in this event: Nanotec Electrónica (Spain), IoP (UK), ScienTec (France), Raith GmbH (Germany), BFiOPTILAS (France), Schaefer Techniques (France) and Interface (Russia).

TNT2004 Exhibitors

IoP | NANOTEC ELECTRONICA
SCIENTEC | Raith
INTERFACE INTERNET & SOFTWARE COMPANY | BFi OPTiLAS an Avnet Company
SCHAEFER

As already mentioned, a characteristic feature of TNT conferences is the large number of students presenting their results at poster sessions. This year, about 236 posters were presented, and among them, 126 were presented by PhD students during Poster session A (exclusively devoted to students). Twenty-two of these students received an award for their poster presentation. The following table summarizes the sponsoring companies, the awards granted and the recipients.

Funded by	Last Name	Name	Country	Institution
NIMS	**Meister**	Andre	Switzerland	CSEM
Award: 400 Euros	Poster: *"Surface Patterning Using Attoliter Deposition by AFM Probes*"			
NIMS	**Patti**	Jordan	USA	UCLA
Award: 400 Euros	Poster: "*Integration of Biological Molecules and Synthetic Membranes to Create Excitable Vesicles* "			
Parc Cientific de Barcelona	**Robinson**	Luke	UK	Cambridge University
Award: 350 Euros	Poster: "*Electrical and Theoretical Results from Self-Aligned Side Gates to Carbon Nanotubes"*			
NANONET	**Collins**	Sean	Canada	McGill University
Award: 325 Euros	Poster:"*Investigation of Switching Fields of Magnetic Nanoparticles with Magnetic Force Microscopy*"			
NANONET	**Van Popta**	Andy	Canada	University of Alberta
Award: 325 Euros	Poster: *"Optical Properties of Nanostructured Porous Thin Films Fabricated Using Glancing Angle Deposition*"			
IRC in Nanotechnology	**Yang**	Ming-Hsun	UK	Cambridge University

Award: 300 Euros	Poster: "*Top and Back Gate Single-Wall Carbon Nanotube Transistors by Rapid Growth Chemical Vapour Deposition Method"*			
AIST	**Sun**	Yan	Canada	McGill University
Award: 300 Euros	Poster: *"Electrical and Mechanical Contacts at the Atomic Scale: A Combined UHV STM / AFM Study"*			
RaithGmbH	**Martinez-Rodriguez**	Luis Javier	Spain	IMM-CNM-CSIC
Award: 300 Euros	Poster: "*Fabrication and Characterization of 2D Photonic Crystals in GaInAsp/InP Semiconductor Laser Heterostructures*"			
IoP Publishing	**Tätte**	Tanel	Estonia	University of Tartu
Award: 300 Euros	Poster: "*Tunnelling Induced Light Generated by Sb-Doped Tin Oxide Tips*"			
iNANO	**Mativetsky**	Jeffrey	Canada	McGill University
Award: 300 Euros	Poster: "*Metals And Molecules on an Insulating Surface: First Steps Towards an Atomically Defined Molecular Device*"			
Phantoms Foundation	**Scappucci**	Giordano	Italy	INFM - Universitá di Roma Tre
Award: 300 Euros	Poster: "*Low Field Magnetotransport in Strained Si-Cavities"*			
NASA	**Perentes**	Alexandre	Switzerland	EPFL
Award: 300 Euros	Poster: "*Fabrication of Periodic Sub-Wavelength Nano-Structures in a 150nm Thick Gold Layer on Glass Slides For Optical Studies*"			
NASA	**Chan**	Jayna	Canada	University of Western Ontario
Award: 300 Euros	Poster: "*Characterization of The Molecular Chemistry of Metal-Based Nanobeads on a Gold Surface*"			
IEEE	**Stomp**	Romain	Canada	McGill University
Award: 300 US Dollars	Poster: "*Detection of Single Electron Charging in Individual InAs Quantum Dot by Noncontact Atomic Force Microscopy*"			
DIPC	**Valles Callizo**	Cristina	Spain	ICB-CSIC
Award: 1 week visit at DIPC with expenses fully covered	Poster: "*Influence of Metals and Reaction Conditions on the Chemical Vapor Deposition Production of Carbon Nanotubes Over Sol-Gel Catalysts*"			
TNT2004 Organisation	**Calleja**	Fabian	Spain	UAM
Award: Free registration to the TNT2005 Conference	Poster: "*Contrast Reversal and Changing Shapes of Atomic Adsorbates in STM*"			
Imperial College Press & World Scientific	**Alvarez-Sánchez**	Rubén	Spain	IMM-CNM-CSIC
Award: Scientific Books	Poster: "*Magnetostatics in Nanostructured Arrays: Beyond the Dipolar Approximation*"			
WILEY-VCH	**Costa**	Pedro	UK	University of Oxford
Award: One Textbook "Nanoelectronics and Information Technology : Advanced Electronic Materials and Novel Devices"	Poster: "*Recent Developments on the Encapsulation of Materials Within Carbon Nanotubes*"			
WILEY-VCH	**Li**	Lain-Jong	UK	University of Oxford
Award: One Textbook "Nanoelectronics and Information Technology : Advanced Electronic	Poster: "*Chirality Assignment: Band Gap Modification of Single-Walled Carbon Nanotubes With Strain*"			

Materials and Novel Devices"				
WILEY-VCH **WILEY-VCH**	**Solomon**	Gemma	Australia	University of Sydney
Award: One Textbook "Nanoelectronics and Information Technology : Advanced Electronic Materials and Novel Devices"	Poster: "*Single Molecule Conductivity: The Role of Junction-Orbital Degeneracy in the Artificially High Currents Predicted by Ab Initio Approaches"*			
WILEY-VCH **WILEY-VCH**	**Yang**	Ming-Hsun	UK	University of Cambridge
Award: One Textbook "Nanoelectronics and Information Technology : Advanced Electronic Materials and Novel Devices"	Poster: "*Nanoauger Spectroscopy Study of Thin Film Metal Catalyst Transformation for the Production of Multi-Wall and Single-Wall Carbon Nanotubes by Chemical Method Deposition*"			
WILEY-VCH **WILEY-VCH**	**Paloniemi**	Hanna	Finland	University of Turku
Award: One Textbook "Nanoelectronics and Information Technology : Advanced Electronic Materials and Novel Devices"	Poster: "*Non-Covalent Functionalization of Single-Wall Carbon Nanotubes to Improve Water-Solubility*"			

The most relevant presentations contributed to TNT2004 were published in a special issue of the journal “Nanotechnology”. This special issue, published by the Institute of Physics Publishing, presented representative contributions describing the main topics covered at the fifth “Trends in Nanotechnology”

TNT2004 Exhibition (1)

TNT2004 Exhibition (2)

Posters Area (1)

TNT2004 Exhibition (3)

Posters Area (2)

3 EUROPEAN PROJECTS

Phantoms Foundation has been successful in attracting grants in 2004 (NaPa, FECyT, etc.) and EU projects represent an important source of funding for its activities.

3.1 NaPa Integrated Project

3.1.1 About NaPa IP.

NaPa
Emerging Nanopatterning Methods

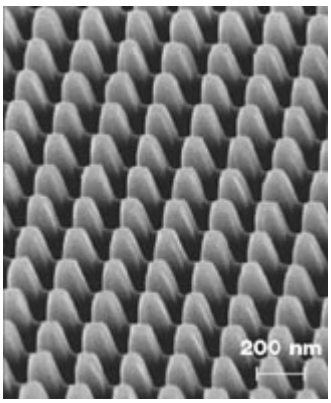
NaPa is an Integrated Project in Framework Programme Six NMP Thematic Priority. The proposed duration of the project is 48 months (March 2004 - February 2008). During that time 31 M€ will be invested in the project and a total of 3500 person months will be contributed by the partners to the project.

The Emerging Nanopatterning Methods (NaPa) consortium integrates the new patterning methods into one project, both anticipating and responding to the increasing need for technologies, standards and metrology required to harness the new application-relevant properties of engineered structures with nm-scale features.

The aim of NaPa is to strengthen the potential of nanotechnology within the European Research Area by bringing together the existing expertise in the field of nanopatterning methods. This integration of expertise constitutes the foundation for innovations leading to breakthroughs in the field of nanofabrication, thus, paving the way to efficient exploitation of the potentials of nanotechnology.

NaPa builds upon the know-how acquired in different countries and in several projects funded within FP5. The critical mass of integrated research effort in the EU is vital in order to ensure standardisation, sustainability and cost-efficient manufacturing. Furthermore, the tools to be developed within NaPa will be less capital-intensive, and the processes are envisioned to be environmentally friendly. Napa brings together 35 leading academic and industrial European institutions with a vast amount of recent know-how on nanofabrication, partly developed within FP5. The NaPa Consortium has the mission to develop a library of processes for nanopatterning based on novel methods like nanoimprint lithography, soft lithography, self assembly, stencilling, scanning probes and UV nanoimprint lithography. The different research teams work together in six different subprojects:

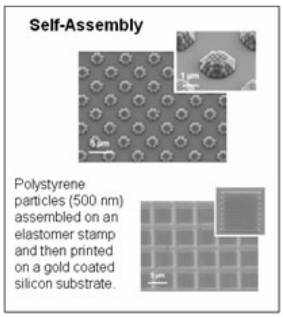
- Nanoimprinting lithography
- Soft lithography & Self assembly
- MEMS based nanopatterning
- Materials
- Tools
- Modelling & Simulation



A brief description of each project can be found below:

- Nanoimprint lithography: Nanoimprint lithography is a polymer embossing process requiring a mold, polymer and temperature-pressure cycle. This parallel process can yield feature sizes in the 10 nm

range. It is the purpose of this subproject to address the roadblock facing nanoimprint lithography to facilitate take up by industry for a range of nanotechnology related application, reducing costs and increasing functionality of nanostructured materials and devices. The key-objective of this subproject is to establish a library of processes for specific applications thereby pushing the design rules limits to combine sub 10 nm with 10 µm features.

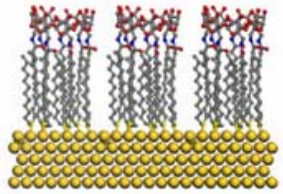


- Soft Lithography and Self-Assembly: Soft lithography will be developed to industrial maturity as an ultra low cost large area patterning process. Self-assembly methods will be optimised to improve yield and specificity to render them viable for future manufacturing processes and will be combined with nanopatterning to create novel structures with a much higher degree of control than previously possible.

- MEMS Based Nanopatterning: This subproject combines two MEMS based nanopatterning methods: Nanoscale dispensing of liquids through apertured cantilever probes, and Stencil, a vacuum deposition method of vaporized material through small apertures. Both techniques are part of the same subproject in order to exploit the existing synergies, i.e. common technological developments to carry out especially in the field of MEMS and nanofabrication.

- Materials: This subproject will design and supply tailored multifunctional materials to fulfil the needs of new patterning methods. Issues like rheology in the nanometer scale will be addressed by experimental investigations. Topics such as molecular weight distribution, persistence length of the polymer, nanoscale stress relaxation and viscoelasticity, macromolecular chain orientation during flow etc., will be tackled. The main emphasis in the beginning of the project will be on materials dedicated for Nanoimprinting. When the technologies of other Sub-areas become maturer, material development for these areas will be emphasised.

- Tools: The equipment used in the field of emerging nanopatterning methods today are typically originally designed for other purposes: These include mask aligners which could be used for embossing, substrate bonding aligners used for stencil techniques and flip-chip bonders used for step and flash/print techniques. Therefore it is easy to perceive the current limitations of the techniques available. The challenges in this subproject are to develop dedicated equipment for Nanoimprint Lithography, Soft Lithography and Micro-Electro-Mechanical Systems (MEMS) with high accuracy alignment, full embossing force control and high process flexibility including recipe editing. These new machines will be partly derived from existing equipment exploiting the technical experience and know-how in the Consortium.



- Simulation: Within this integration theme, modelling support for the fabrication activities will be developed and applied. Activities include computational materials science and mesoscale simulation to understand the formation of the fabricated structures, and MEMs scale modelling for optimisation of the fabrication tools.

- Training and dissemination: The development of nanotechnologies and their dissemination in the daily life of citizens suffers from technological bottlenecks like the lack of maturity of mass production processes at the nanoscale. However, the development of innovative techniques and the blooming of new paradigms of production is so spectacular

that probably in a very near future, the main cause of the slowing-down of this economic sector will probably shift from technological to human resource limitations. Indeed, it appears to be of strategic importance to educate a large number of young engineers and scientists to these new technologies. In NaPa project, training and education activities will be implemented in order to strengthen the educational structures (universities, engineering schools …) for the initial formation of young technologists as well as other structures for training already active engineers, technicians or scientists in the area of Nanopatterning and Applications. The main objective will be to attract young people that exhibit less and less natural attraction for “hard” science to this new cross-disciplinary domain. We want to implement new formations that will contribute to create new specializations in anticipation of the strong demand of the next decade in this sector of activity. Another ambition will be to progressively transform the poor image of technology in the academic community towards a cross-disciplinary scientific area, where both fundamental knowledge and good engineering must be assembled.

- ***Courses.*** Among NaPa partners, the information gathering exercise concerning courses on and or directly relevant to Nanopatterning resulted in returns from 11 partners. These partners offer 42 courses in total. The courses are at both undergraduate and postgraduate level, sometimes fee-paying and sometimes free of charge. The courses come from the following disciplines: Physics, Chemistry, Biology, Electrical Engineering and Mechanical Engineering. They cover a knowledge based spanning from materials science (nanoparticles, polymers), through semiconductor physics, supramolecular chemistry, electronics and optoelectronics, instrumentation, electronic engineering methods, micro- and nano-structuring and up to device realization and testing.
- ***Practical Courses.*** In addition to these conventional lectures, one ambition of the project will be to implement practical courses on nanofabrication. Indeed, as in NAPA project we develop low cost nanofabrication procedure, it appears possible to optimize a robust process of nanofabrication that does not require heavy infrastructures and that could be easily implemented in various universities and engineering schools.

The NaPa project addresses the Community socio-economic objectives from many vantage points. In response to the need for the transformation of industry towards higher added-value operation, the consortium benefits from each industrial participants, which ensure that the nature of nanopatterning addresses future demands of the ICT, pharmaceutical, biotechnology, health and medicine sector.

Moreover, the project encourages the combination of academic education and industrial training, thereby promoting uptake of results emerging from nanoscience and nanoengineering. In this way it opens opportunities for new industrial products. Through the educational activities of the consortium, a genuine enthusiasm for science and its applications are nurtured. For this reason, and complementing R&D, the consortium has designed exciting nanoscience and nanoengineering courses to advance the training of the next generation of scientists and engineers and to create a positive attitude towards science among young people.

Dissemination activities towards the lay public and sectors underrepresented in nanotechnology form an integral part in NaPa. Thus, NaPa offers a unique opportunity to unleash the potentials of nanotechnology in Europe.

As a crucial aid for this task, Phantoms foundation was sub-contracted by NaPa consortium (from September 2004) to carry out all dissemination activities and to design and maintain a web page for the project.

3.1.2 Website

Project web page plays a very important role in the dissemination activities carried out by NaPa. The address of the NaPa web site is: http://www.NaPaIP.org
The webpage has been divided in two separate areas: public and private.

- An open access area was set up for both the scientific community and the general public. This public site of NaPa is freely accessible by anyone. Public documents available at the external www-site are in PDF-format to facilitate its dissemination.

- The restricted-access intranet (version 1.0 online in 2004) was set up with the purpose to serve as a forum to activate debate on new emerging ideas and enhance communication between project researchers. This restricted area or Intranet is restricted to project partners only. When possible, internal documents published in this restricted-access area are published in original format to facilitate modifications by partners and data exchange.

The specific tasks coordinated and performed by Phantoms Foundation as responsible for the web page are:

- Design, development and updating of the NAPA www-pages (maintenance) in both public and restricted areas.
- Management of the restricted area (sub-projects, members, etc.).
- Management of mailing lists (sub-projects, members).
- Preparation of NaPa plenary meetings WEB pages.

3.1.3 First NaPa plenary meeting (Segovia)

13 -14 September 2004
Segovia, Spain
http://www.phantomsnet.net/TNT04/napa.php

The first NAPA plenary and sub-projects meeting was organised Segovia, Spain (September 13-14) in parallel with the TNT2004 conference. Access was restricted to NaPa members, and Phantoms Foundation was fully responsible for the organisation of the event.

As already mentioned, NaPa brings together 35 leading academic and industrial European institutions with a vast amount of recent know-how on nanofabrication, partly developed within FP5. A very important part of this project is to guarantee that all partners have access to the data obtained by the rest of NaPA members, and that they all stay connected and pursuing the same common goal. Here the rationale for the annual plenary meetings.

Complementing R&D, the consortium aims to design exciting nanoscience and nanoengineering courses to advance the training of the next generation of scientists and

engineers and to create a positive attitude towards science among young people. Therefore dissemination activities towards the lay public and sectors underrepresented in nanotechnology form an integral part in NaPa.

1st NaPa plenary meeting at a glance

- 65 Participants from 14 different countries

Participants per Country

Austria	1
Denmark	3
Finland	5
France	11
Germany	5
Ireland	7
Italty	4
Netherlands	3
Poland	1
Russia	2
Spain	6
Sweden	4
Switzerland	10
UK	3
TOTAL	**65**

Subprojects
Nanoimprint Lithography *Coordinator: Clivia Sotomayor Torres (NMRC, Ireland)*
Soft Lithography and Self-Assembly *Coordinator: Bruno Michel (IBM, Switzerland)*
MEMS-based Nanopatterning (includes nano-stencil and dip-pen) *Coordinator: Juergen Brugger (EPFL, Switzerland)*
Materials *Coordinator: Gabi Grützner (Micro Resist Technology GmbH, Germany)*
Tools *Coordinator: Jörg Kühnholz (SUSS, Germany)*
Simulation *Coordinator: Jim Greer (NMRC, Ireland)*
Training and Dissemination *Coordinator: Christophe Vieu (LAAS/CNRS, France)*

3.2 PHANTOMS Thematic Network

http://www.phantomsnet.net/Projects/projects_archive_ISTNet.php

3.2.1 About PHANTOMS TN

The PHANTOMS Network was funded by the European Commission under the Fifth Framework Programme (IST programme: IST-2000-26021): December 2001 – November 2004 (4 years duration). It consisted of an interdisciplinary worldwide platform in the Nanotechnology for Information Processing and Storage field, where its more than 200 members from 32 countries worldwide are interconnected thanks to a WEB based support, scientific exchanges (conferences, workshops and visits) and a large series of resources. The main objective of the PHANTOMS network on Nanoelectronics was to provide both researchers and industry access to the tools needed to create a multidisciplinary community and maintain them at the forefront of the nanoelectronics revolution. Moreover, several novel activities and collaborations were set up in order to promote European research as well as to strengthen contacts between the academy and the industry. In the fast emerging nanoelectronics field, the PHANTOMS Network aimed and succeeded on promoting European science and research through a pluri-national networking action, put together research capacities present in the various European regions and stimulate commercial nanoelectronic applications.

The Foundation has been involved as a partner in this European Network of Excellence from March 2003 until November 2004.

2004 Phantoms Foundation partner tasks:

- Coordination of the network newsletter editing (3 issues published in 2004)
- NID Workshops organisation (2)
- Network WEB site development and maintenance
- Network reports

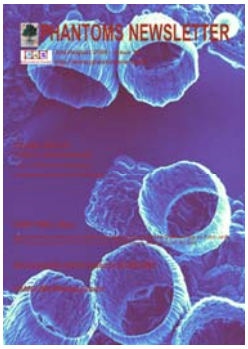
3.2.2 PHANTOMS newsletters

The printed PHANTOMS newsletter was distributed on a regular basis to keep PHANTOMS members aware of the network evolution (new members and activities, grants, collaborations with industry and other networks, jobs, conferences, scientific articles, reports on network activities, publication highlights, etc.). This document was primarily intended as an information platform for network partners and a way to stimulate opportunities for mutual gain. Members were encouraged to publish hot results as well as short review papers on research areas mapped by PHANTOMS (see below). This document was distributed worldwide scale (printed version) and a short version published in the public WEB site in pdf format downloadable document. Full pdf version was restricted to members and associated members (joint collaborations between PHANTOMS and other entities or networks such as NEXUS).
The principal aim of the PHANTOMS Newsletter is to provide information in the field of Nanotechnology for information processing and storage. Each issue includes scientific review articles, upcoming conferences, Nano-vacancies and updated news on the network such as new members, NID workshops details and other relevant information.

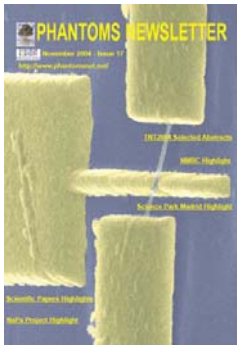
- The 15th issue was sent to network members by mail (300 copies were printed). A few copies were distributed at the 14th NID Workshop in June 2004 (Agelonde, France).
- The 16th issue was sent to PHANTOMS members by mail (325 copies were printed). A few copies were distributed at the TNT2004 International Conference in September 2004 (Segovia, Spain).
- The 17th issue was sent to network members by mail (1000 copies were printed). Copies were distributed at the 15th NID Workshop in January/February 2005 (Madrid, Spain) and in several other high-level conferences organised by the Phantoms Foundation.

Network newsletters published by the Phantoms Foundation partner (2004)

Issue 15 of the PHANTOMS Newsletter (44 pages)



Issue 16 of the PHANTOMS Newsletter (40 pages)



Issue 17 of the PHANTOMS Newsletter (48 pages)

3.2.3 NID workshops

http://cordis.europa.eu/ist/fet/nid.htm

The Nanotechnology Information Devices (NID) pro-active initiative supported innovative research aimed at the development of new concepts for information processing systems operating at the nano-scale. NID drawn from successful work under MEL/ARI while broadening the scope to cover any research field that could contribute in shaping future visions for information processing nano-systems, from quantum electronics to nano-mechanics and biology.

These meetings were organised six-monthly as cluster reviews accompanied by workshops facilitating collaboration among running FP5 projects of the related Nanotechnology Information Devices Initiative.

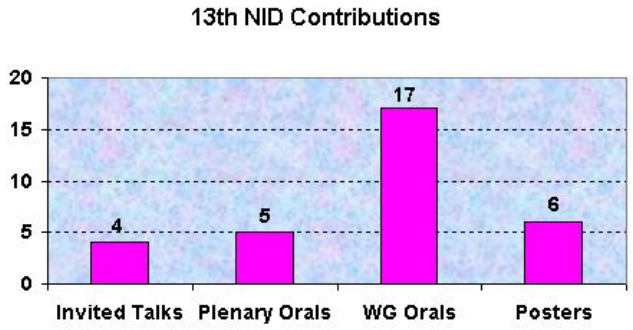
PHANTOMS Network provided financial and technical support for the six-monthly (NID) Workshops organization. Each NID workshop gathered participants in the projects funded within the NID pro-active initiative. Presentations from the EU projects and invited talks from experts outside the NID initiative took place during each workshop plenary & working group sessions and were focused on the application of a broad range of nano-scale technologies to information processing and on the perspectives for replacing mainstream approaches, such as CMOS, when they will reach the expected physical limits for miniaturization (an example of schedule, with some statistics, is provided below)

This series of workshops was organised in 2004 by the Phantoms Foundation in collaboration with the European Union.

3.2.3.1 13th NID Workshop: 4-6 February 2004, Athens (Greece).

The 13th European Conference Melari NID on Nanotechnology and Nanoelectronic devices was organized with great success on 4-6 February 2004. This meeting gathered participants in the projects funded within the Nanotechnology Information Devices (NID) pro-active initiative. The NID initiative is part of the Information Society Technologies priority of the 5th Framework Programme of the European Union. It focuses on the application of a broad range of nano-scale technologies to information processing and on the perspectives for replacing mainstream approaches, such as CMOS, when they will reach the expected physical limits for miniaturisation.

The workshop staged the review meetings of 8 projects in the NID initiative, plenary presentations from invited speakers, and working group meetings on advanced research topics in nanotechnology and nanoelectronics.



In this conference, the partners of 26 European programs about future emerging Nanoelectronic technologies participated, on the framework of IST FET program for Research, and scientists of international reputation from the United States, Canada and Europe acted as guest speakers. The conference's works were conducted in 6 parallel classrooms and were attended by about 200 Participants.

Acronym	Project Number	Project Title
BEST	IST-2001-39266	Biomolecular rEcognition by integrated Smart sensor Technology
DNA-nanowire	IST-2001-38951	DNA-Based Nanowires
MOLSWITCH	IST-2001-38036	A Molecular Magnetic Switch that links the Biological and Silicon Worlds
NANOCOLD	IST-2001-32264	Nanodeposition of Active Ordered Structures by Cold Atoms Technologies
NANOMAGIQC	IST-2001-33186	Nanotechnology and Magnetic Qubits to Implement Quantum Computation
NANOTERA	IST-2001-32517	Ballistic Nanodevices for Terahertz Data Processing
SPINOSA	IST-2001-33334	Spin polarized injection in nanostructures and devices
NEAR	IST-2001-32300	Nanoscale electronic elements and circuits for operation at room temperature

3.2.3.2 14th NID Workshop: 14-16 June, 2004, Agelonde (France).

The 14th NID Workshop was organised in parallel with the "Ultimate Lithography and Nanodevice Engineering" Conference (LITHO2004). This conference was hold in the

resort Agelonde, near St-Tropez (France). EU project reviews and Working Groups took place during the conference. Apart for the project review, NID14 participants also attended the working groups and the Industrial Day session.

Several Nanotechnology Information Devices (NID) projects were reviewed in a closed session with external reviewers. The following table lists the projects that were reviewed at the 14th NID Workshop.

Acronym	Project Number	Project Title
CANVAD	IST-2001-33566	Carbon Nanotubes for Microwave Vacuum Devices
CHIC	IST-2001-33578	Consortium for Hamiltonian Intra-Molecular Computing
FT-EA	IST-2001-38930	Using Fault-Tolerance Techniques to Combat Electrical Aspects in Deep Sub-Micron IC Technology
GINA 1.5	IST-2000-26478	GaInNAs-based Semiconductor Heterostructures for 1.5 μm Opto-electronics
LIMM	IST-2001-35503	Light Induced Molecular Movements. Photo-gated devices
MECHMOL	IST-2001-35504	MECHanized MOLecules
MINT	IST-2001-32152	Molecular Interconnect for NanoTechnology
SAMBA	IST-2000-29685	Self-Assembling of copper Metalloproteins at nanoscale for Biodevice Applications

3.2.4. Network Reports: The Status of Research into Architectures for Nanoelectronics and Nanophotonics Systems in the European Research Area - RANNS

There is a large amount of European and world-wide research into nanoelectronic and nanophotonic devices, but much less effort is being applied to examining possible *system architectures* which might use these devices to best advantage. Such research is needed, because single devices will not be very useful - what is needed are systems with more than 10^{10} to 10^{12} devices per cm^2, so that the present-day increases in computing power can be extended into the future. To achieve such large assemblies will be a major technological challenge, and research and planning is needed *now*, if delays are not to occur.

The report includes summaries of work in progress in the following areas:
1. Existing and proposed devices;
2. Small and ultra-large circuits: theory and practice
3. Conventional architectural concepts: 'System on a chip', 3D systems etc..
4. Known problems
5. Unconventional and new concepts
6. Applications – performance requirements
7. Availability and training of human resources

Information is also provided on the availability in Europe of researchers and training courses.

The RANNS report, prepared during 2004 in close collaboration with Prof. Michael Forshaw (University College of London, UK), will be published beginning of 2005 by the Phantoms Foundation (out of the EU network framework).

4 OTHER ACTIVITIES

4.1 Spain NanoTechnology Think Tank 2004 (SNT3 2004).

Phantoms Foundation together with the Parc Científic de Barcelona (PCB, Barcelona Science Park), the Madrid Science Park (Parque Científico de Madrid, PCM) and the Spanish Foundation for Science and Technology (FECYT) organized the first meeting of the Spanish NanoTechnology Think Tank (SNT3 2004). This event took place in San Lorenzo del Escorial (Madrid, Spain), December 01-03, 2004.

The idea behind this think tank was to agglutinate the different agents who take part in the process of the "I+D+I" system in nanotechnology. The goal was to create a nucleus from which a permanent forum would arise. All with the permanent idea of allowing society to take maximum advantage of the knowledge generated by Spanish scientists. This Think Tank also aimed at identifying possible areas of collaboration between researchers from each one of the scientific disciplines and the different industrial sectors, being one of the main objectives of this initiative to define strategic lines of research linked to the industrial sector. This forum sought to orient Spanish research on nanotechnology towards applications that meet the needs of the business sector, and also to introduce this technology into industrial processes.

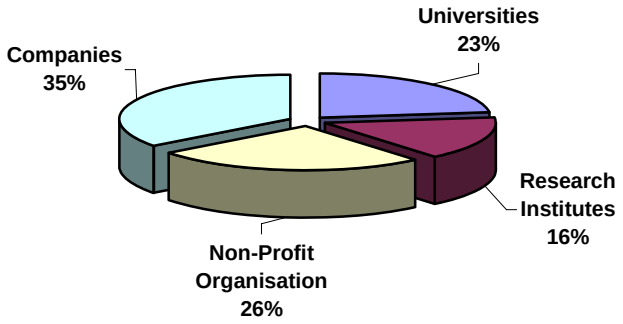
SNT3 at a glance

- 82 Participants
- 5 Thematic sessions

The Think Tank was extremely successful at creating of a work scenario in which scientific, technological and business ideas could be freely exchanged.

During this forum, researchers from around Spain, representatives from the industrial and technological sectors, investors and public administrations came together to discuss how nanotechnology can contribute to driving progress in sectors such as biomedicine, energy, aerospace, defence, electronics and materials. The participants were 25 researchers, 9 observers, 20 entrepreneurs, 5 coordinators and 5 knowledge reporters.

The organization of the forum as a "think tank" allowed the establishment of work teams in which nanotechnologists and representatives for the business sector exchanged ideas with the aim to find solutions to meet the needs of the distinct industrial sectors.



All the information available, together with the ideas discussed during theSNT3 2004 were compiled in a book that collects the conclusions drawn in this first SNT3 meeting. The book will be presented at the opening ceremony of the SNT3 2005, to be held in the International Convention Centre of Barcelona on June 2005.

The SNT32004 was structured in five working groups that included several internationally renowned researchers in the area of Nanotechnology and some the most active and successful industrial and technological entrepreneurs in the field. The success of the Think Tank was secured by the inclusion of financial investors and politicians in each working group. The five working areas were:

- Aerospace and Defense
- Biomedicine and Pharmacology
- Energy
- Electronics, Informatics and Telecommunications
- Chemistry and New Materials

Results of the SNT32004

- Creation of the Think Tank permanent group to facilitate the exchange of ideas
- Publication of SNT32004 report. This publication was distributed within both the scientific and business communities.
- Identification of new strategic research areas currently absent from research institutes
- Creation of new collaboration and partnership opportunities among researchers from different disciplines and companies/enterprises.

For additional information and relevant documents, please visit http://www.snt3.net/

4.2 Spanish Nanotechnology Report (FECyT).


Estudio de las actividades y necesidades, en el área de las Nanociencias/Nanotecnologías, para:

1.- La mejora de la formación de técnicos

2.- El establecimiento de un mapa de infraestructuras durante el periodo 2005-2010 en España

Realizado por la Fundación PHANTOMS

Financiado por la FECyT

Con la colaboración de la red NANOSPAIN

Enero 2005

At the beginning of 2004 the Spanish Foundation of Science and Technology (Fundación Española de Ciencia y Tecnología (FECyT) entrusted Phantoms Foundation, with the contribution of the Spanish Network of Nanotechnology (NanoSpain), with the elaboration of a report on the Nanosciences and Nanotechnology-related infrastructures available in Spain (Map of Infrastructures in Technology). This document should reveal the needs in these areas for the 2005-2011 period.
With that objective in mind, Phantoms Foundation launched a survey that was sent to different Spanish research institutions (Universities, Spanish National Research Council (Consejo Superior de Investigaciones Científicas, CSIC), Spanish Science and Technology Parks and Centres, and Private Research Centres). The answers obtained permitted us to fulfil two main objectives:

1.- Establishing a map of the existing infrastructures related to Nanotechnology (including equipment that belongs to common core facilities as much as instruments that are used exclusively by the research group responsible for its maintenance).

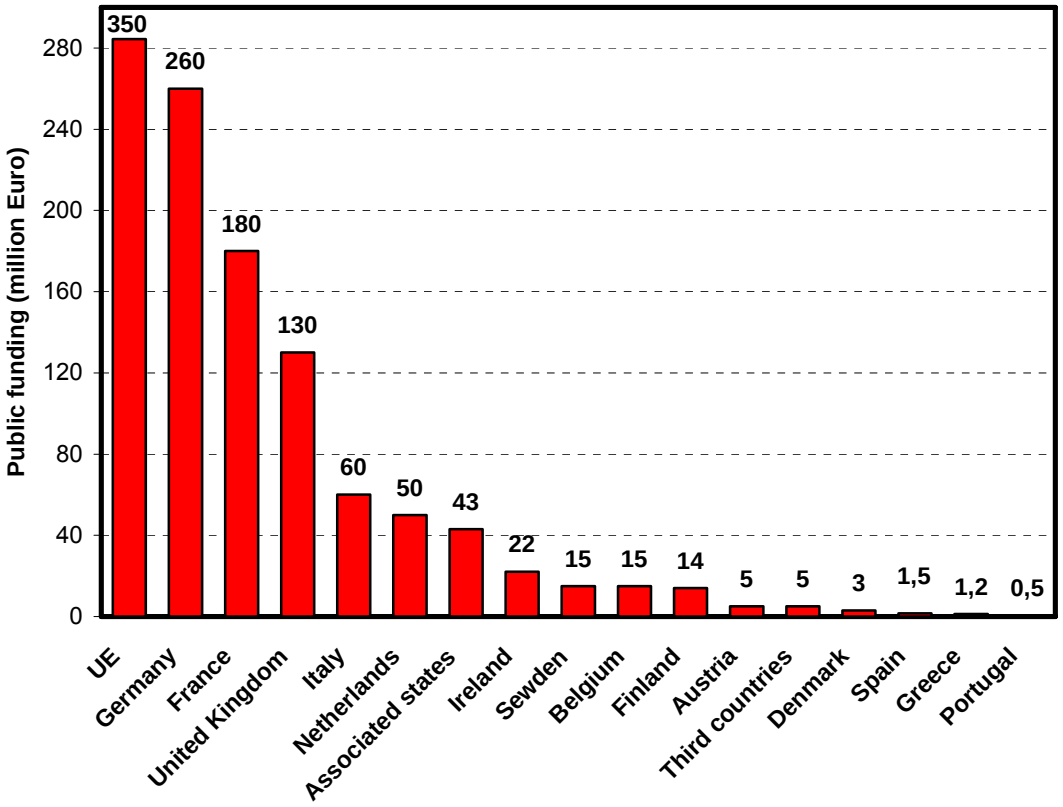
2.- Establishing a map of infrastructures that are likely to be needed over the short- or medium-term. This should allow competent agencies to plan accordingly and design the financial aids dedicated to equipment in a timely manner.

The survey was sent by e-mail to more than 1500 researchers, and their responses analysed and published on December 2004 in a report entitled *"Estudio de las actividades y necesidades, en el área de las Nanociencias/Nanotecnologías, para: 1. La mejora de la formación de técnicos. 2. Las necesidades de infraestructuras para el periodo 2005-2010 en España"* ("Study of the activities and needs in the area of the Nanosciences/Nanotechnologies for: 1. Improvement of the of the formation of technicians. 2. Infrastructure need in Spain for the 2005-2010 period").

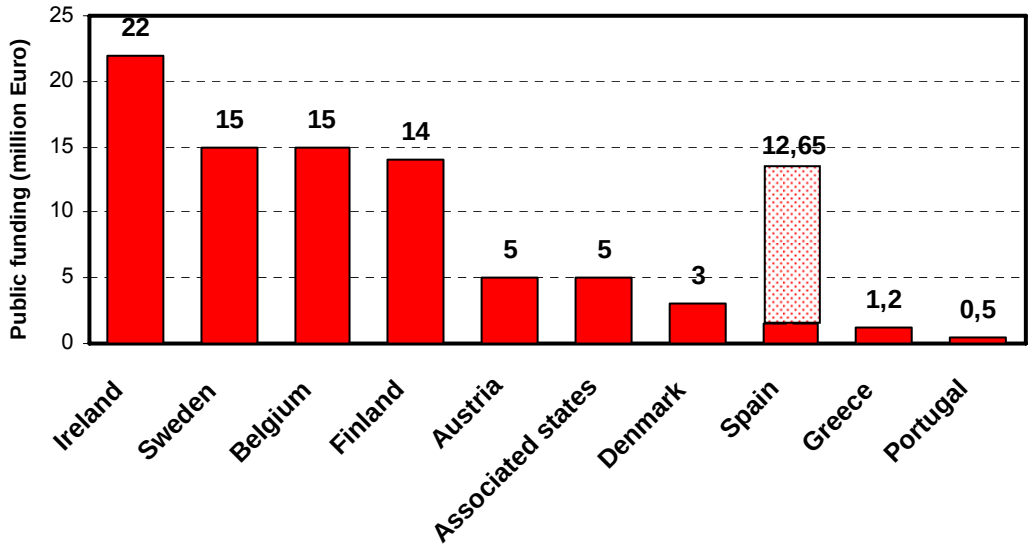
The main conclusions and recommendations emerging form the analysis of the surveys can be found in the aforementioned report. Although is not our intention to make a comprehensive analysis of the results obtained, the two main inferences from the data collected are presented below.

1) An important number of projects have been financed by private companies and Autonomous Communities. This last source of financial support is particularly relevant in the Basque Country. The main source of income for Spanish researchers on the area of Nanoscience and Nanotechnology is the Spanish Central Administration, with a total of 32 million euros. According to the results of the survey, the European Union (EU) contributed to Spanish Nanotechnology research with 18 million euros. In addition, Spanish researchers obtained a total of 5 million euros from other sources not related to neither the EU nor the Central Administration. Total funding received during the period analysed summed up to 55.745.000 euro, and the annual average was 11.149.00 euros.

Although it is true that in Spain the investment on research and development (R&D) is significantly lower to that of other European countries, this report shows that the total numbers are not as low as reported by the EU. According to the 2003 data published by the EU (see chart below) regarding the financing of the Nanotechnology sector in Europe [including the EU-15, adherent countries (CZ, LV, LT, SI) and associated countries (CH, IL, NO)], Spain was dedicating only 1.5 million euros to Nanotechnology and Nanoscience R&D, what was relegating Spain to the bottom of the list, just before Greece and Portugal.

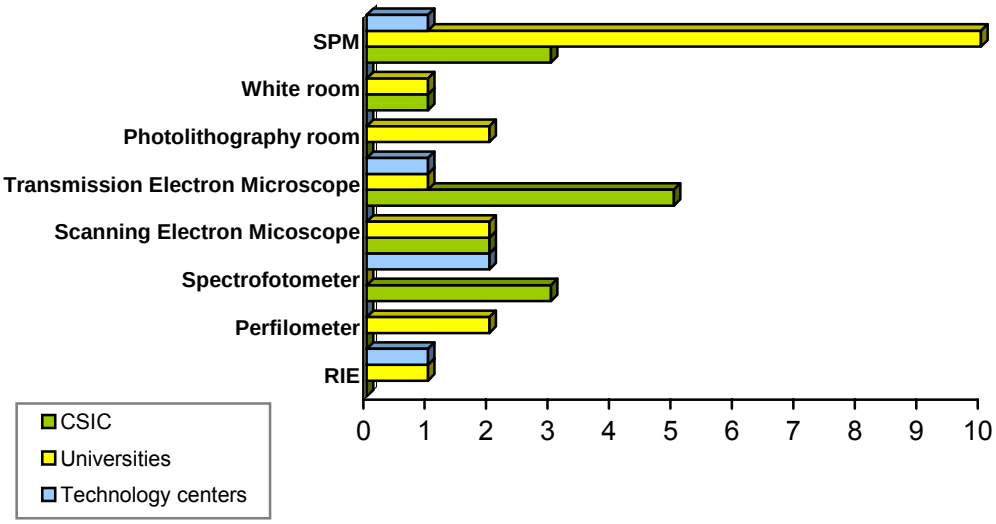


But when we compare this figure (1.5 million euros) with the total amount of funding received by Spanish researchers that answered the survey, a completely different situation arises. According to these new data, Spain would be investing an additional 11,15 million euros in this field, what would add up to a total of 12,65 million euros. It is important to point out that, even if the resources devoted to Nanotechnology research are far away from being optimal, the situation is not as serious as initially thought. Taking these data together, we can say that Spain is investing on Nanotechnology/Nanoscience research a minimum of 12,65 million euros per year (see chart below). It is important to mention that this would be the minimal amount invested as, given the reduced size of the sample space (90 researchers), it is likely that there would be some deviation from the amount estimated.



2) Research groups elaborated a list of those pieces of equipment they felt were the most necessary technological demands. Researchers sent us a list of the 84 most wanted equipments (see graph below). The total purchase cost of these would be 19.020.000 euros. It is important to keep in mind that given the relatively reduced (although significant) sample space, it would be necessary to multiply this number by a factor of 3 or 4 to estimate the actual financial load.

Being the Scanning Probe Microscope (SPM) the most common piece of equipment among the Spanish Nanotechnology labs, it is also one of the most requested facilities, followed by the Transmission Electron Microscope (TEM).



For Spain to be able to play a relevant role on the development of Nanoscience and Nanotechnology, it will be necessary to invest in a broad range of infrastructures, equipment, technical instruments, and very importantly, on formation of personnel, mainly technicians and technical engineers.

5 USEFUL INFO

5.1 Phantoms Foundation Location

We are located in the Parque Científico de Madrid (http://www.fpcm.es/). Our central office is in the Pabellón C within the Cantoblanco Campus of the Universidad Autónoma de Madrid (UAM). This location presents countless advantages, being one of them its proximity to the science departments that belong to the University. Furthermore, it is surrounded by several research institutes that belong to the Spanish Research Council (Consejo Superior de Investigaciones Científicas, CSIC): Centro Nacional de Biotecnología (CNB), Instituto de Ciencia de Materiales de Madrid, Instituto de Catálisis y Petróleoquímica, Instituto de Cerámica y Vidrio, or affiliated at the same time to both the University and CSIC, such as the Centro de Biología Molecular “Severo Ochoa” (CBMSO).

In the same building are also located the Fundación General de la Universidad Autónoma, the Enterprise Initiatives Centre (Centro de Iniciativas Emprendedoras, CIADE), the Research Centre on the Knowledge Society (Centro de Investigación sobre la Sociedad del Conocimiento, CIC) and a bank (Caja Madrid). The building has different seminar rooms, classrooms and an auditorium for 180 people.

Location of Phantoms Foundation.

5.2 Board of Trustees & Staff

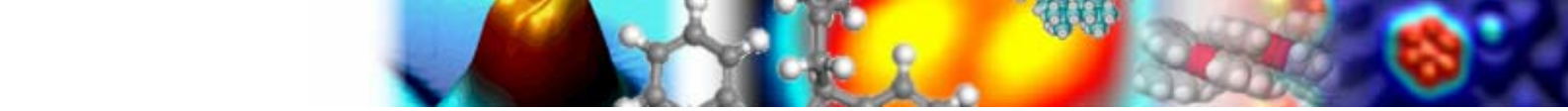
President: Dr. Antonio Correia (co-founder)

Board: -Prof. Clivia Sotomayor Torres (co-founder)
-Dr. Adriana Gil

Staff: -Fernando Hernández
-José-Luís Roldan

- Antonio Correia (President and co-founder)

Antonio Correia received his Dr. Phil. in Materials Science in 1993 (Paris 7 University, France) while working at CNRS (French National Research Institutes). He carried out his postdoctoral training at the CNRS and CSIC (Spanish Research Council), in France and Spain, respectively. During this period he participated in several European Projects (BRITE/ESPRIT) related with basic Field Emission (FE) research, FE Displays development (MICROGUN) and Nanotechnology (NANOWIRES). He is author or co-author of 50 scientific papers published in international journals, and has been guest editor of several books.



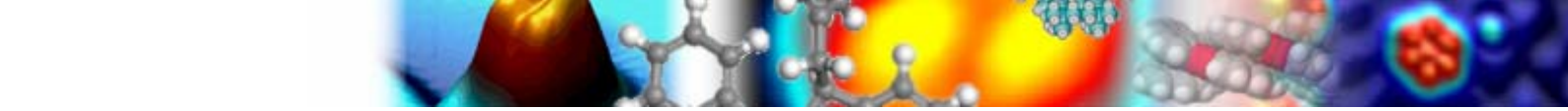
Besides being the president and co-founder of the non-profit organization Phantoms Foundation, Antonio is the coordinator of the Spanish Nanotechnology Network (NanoSpain). In addition he belongs to the editorial board of the international journal "Nanotechnology" (IoP). Antonio Correia is chairman of the international conferences "Trends in Nanotechnology" (TNT), "Ultimate Lithography and Nanodevice Engineering" (LITHO), NanoSpain Workshop and of the EU Workshop "MEL-ARI/NID". He is a fellow of "Institute of Physics"

- Clivia Sotomayor-Torres (Co-founder)

Professor Clivia M. Sotomayor Torres started her physics studies at the University of Chile, Faculty of Science in 1973. She obtained her BSc. (Hons.) Physics in 1979 (Southampton University, UK) and her Dr. Phil. in Physics in 1984 (Manchester University, UK). During 1983-1984 she was a research assistant at the University of St. Andrews (UK). This appointment was followed by: 1984-87 Lecturer in Physics, St. Andrews University (UK), 1986-1996 Lecturer and Senior Lecturer in Electrical Engineering at the University Glasgow (UK). Clivia has received three prestigious awards from the Royal Society of Edinburgh, the Nuffield Foundation, and an Amelia Earhart Fellowship from ZONTA International (USA) in 1993, 1990 and 1982, respectively. From August 1996 to February 2004 she was Professor of Materials Sciences in Electronics at the University of Wuppertal, Germany. In March 2004 she joined the then NMRC, now Tyndall National Institute, at University College Cork, Ireland, as a Research Professor, where she set up a new group on Photonic Nanostructures funded by the Science Foundation Ireland, the European Commission and the Volkswagen Foundation.
She carries out research in the field of science and engineering of optical nanostructures, especially novel lithography methods for their realisation, such as nanoimprint lithography, as well as light propagation and emission in periodic and quasi-periodic media. More recently her research work has extended to confined phonons in silicon-on-insulator thin films and nano-addressing using inorganic nanotubes.
She is author of over 260 scientific publications and has edited six technical books. She acted as Convenor of the University of Wuppertal senate Committee for the Advancement of Women and served as expert on the Advisory Group to the Scottish Higher Education Funding Council on the Women into Science, Engineering and Technology Programme. She has participated in several EU projects since 1989, including, NANSDEV, PHANTOMS, NANOTECH, CHANIL, MONALISA, APPTech, NANO ARCH Review and PHOBOS. She currently participates in FUNLIGHT and EUROSOI, coordinates PHAT and serves on the Management Board of the Integrated Project "Emerging Nanopatterning Methods" (NaPa) as lead partner on nanoimprint lithography. Clivia is the coordinator of the IST Network of Excellence "Nanophotonics to realise molecular-scale technologies" (PHOREMOST).

- Adriana Gil (Board member)

Adriana Gil received her PhD in Physics at the Universidad Autónoma de Madrid (New Microscopies Laboratory) studying adsorption of liquids on surfaces and tip sample interaction on SFM. She was also an Invited researcher at the Chemistry Dep. (Princeton University) for the project of Nanografting of SAM monolayers with SFM in liquid environment.
She has worked at CMP-Cientifica taking part in the coordination and development of Nanotechnology Networks such as the Thematic Phantoms Network (EU). She is member of the Phantoms Foundation Board and the Technical Organising Committee of the



"Trends in Nanotechnology" International Conference.
She is now the Scientific Director of Nanotec Electronica (Spain).

Staff: Our greatest strength is our workforce. The Phantoms Foundation team is formed by highly qualified individuals. We foster a work culture that is built on trust, respect, teamwork, communication and creativity.

- Fernando Hernández

Fernando obtained his BSc. Applied Physics in 2002 (Universidad Autónoma de Madrid, UAM). After graduation he completed several training courses including: Local Nets Systems Administrator, Industrial Automatization and Robotics (EUITT-UPM), HTML Web Edition (UAM), C Programming (UAM) and Designer-Installer of Solar Energy systems (CENSOLAR).

He also took several Doctorate Courses at the UAM, among them Ion-matter interaction: basic concepts and applications, Materials physics, Computer science methods, Synthesis, characterization and applications of nanostructured materials, Preparation and characterization of coatings and thin layers and Photonics I.

He joined the Phantoms Foundation on April 2003 where his computer skills and database knowledge, combined with a solid formation in Physics, became fundamental. Since the beginning he has been particularly involved on the development of the Foundation conference web sites. He is also a part of the technical committee of several national and international conferences and workshops

- Jose Luis Roldán

Jose Luis obtained his BSc. Organic Chemistry (Universidad Autónoma de Madrid, Spain), Faculty of Science, in 1998. From 1998 to 2000 he carried out his Master studies, that culminated with the defence of his Master`s thesis in September 2000. From that date to beginning of 2003, Jose Luis worked for the pharmaceutical company Lilly S.A., were he was devoted to the synthesis of active compounds designed to fight diseases such as pancreatic cancer or AIDS. In 2003 the Universidad Complutense de Madrid (Spain) granted him a Pedagogical Aptitude certificate.

In November 2003 Jose Luis joined the Phantoms Foundation team. Here he is the contact point of the Spanish Nanotechnology Network, NanoSpain. He is also a member of the technical committee of several national and international conferences and workshops, and is responsible for the publication of several technical reports. Jose Luis is involved in different aspects of the preparation of the conferences and workshops organized by Phantoms Foundation. Among other things he is responsible for the preparation of the books of abstracts and multimedia CD-ROMs distributed at each conference, and for the design of the conference posters.

5.3. Links

	Universidad Autónoma de Madrid (UAM)
	http://www.uam.es
	Consejo Superior de Investigaciones Científicas (CSIC)
	http://www.csic.es
	Parque Científico de Madrid (PCM)
	http://www.fpcm.es/
	NaPa Integrated Project
	http://www.napaip.org
	EU/IST/FET/NID proactive Initiative
	http://cordis.europa.eu/ist/fet/nid.htm

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Annual Report 2004

PHANTOMS FOUNDATION