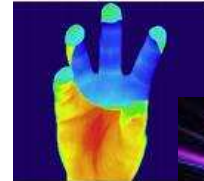




April 2009



PhotonicRoadSME turns 1 year!

Dear reader,

now, already 12 months of ambitious work have passed and the PhotonicRoadSME project is on the right way for the development of its technology roadmaps. Just a quick retrospect ...

In the last year, the consortium of the project gathered huge amount of information concerning 9 nanophotonic material categories, their barriers related to technology, fabrication and/or market, their current and possible applications in novel photonic devices as well as future trends and the opportunities they can seize. These information was supported by expert interviews conducted with over 20 well-known international experts as well as by an expert panel meeting, where the results of these reports have been validated and complemented.

Besides this "technology-driven" approach, the project additionally followed a "market-driven" approach simultaneously, in order to identify the specific needs of small and medium sized enterprises (SMEs) active in the fields of photonics. For this purpose, a questionnaire was launched all over Europe in order to obtain information about technology related and socio-economic barriers of these companies as well as their strategic criteria for their future strategic R&D activities. Additionally, technology audits have been conducted in order to get more precise information from the SMEs about the barriers they are confronted with.

The survey and technology audits are now evaluated and the results are presented in short within this newsletter. Furthermore, SWOT analyses for the four pre-defined industrial sectors are right now compiled, highlighting the strengths, weaknesses, opportunities and threats of photonics within these sectors. All these results will be integrated into the roadmapping process and help to identify starting points for the systematic support of individual SMEs by developing individual technology roadmaps for them.

For a methodical handling of all collected information and results of the technology-driven as well as the market-driven approach, the dynamic PhotonicRoadSME roadmapping tool (database) is filled with the collected data. Then, at the beginning of the second year of the project, the SME-type specific and industrial branch-specific roadmaps will be developed, published and adapted to the SMEs.


We hope that you will enjoy this newsletter and we are looking forward to your feedback.

Yours sincerely,

the PhotonicRoadSME consortium

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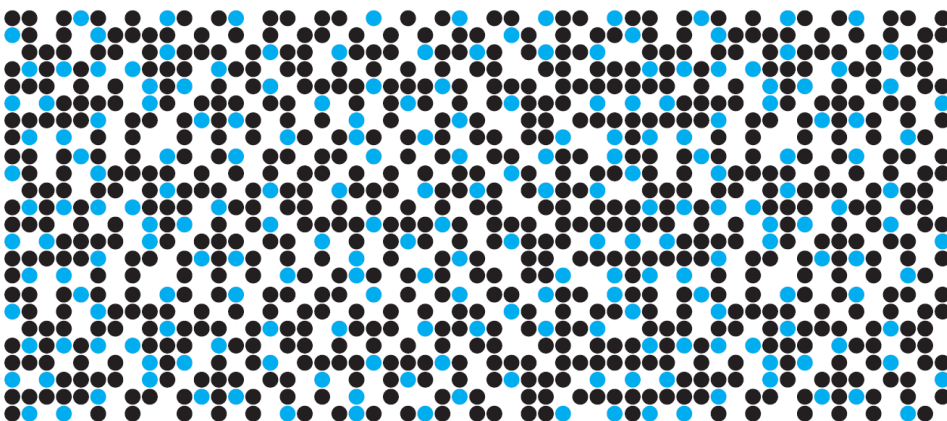
**Spotlight on
PhotonicRoadSME**

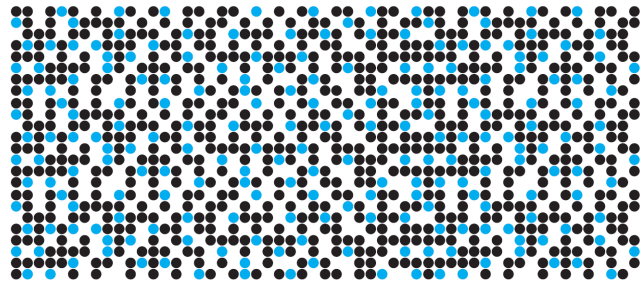
FP7 - Support Action in
Programme Theme 3

Project number
224572

Duration
05/2008 - 04/2010

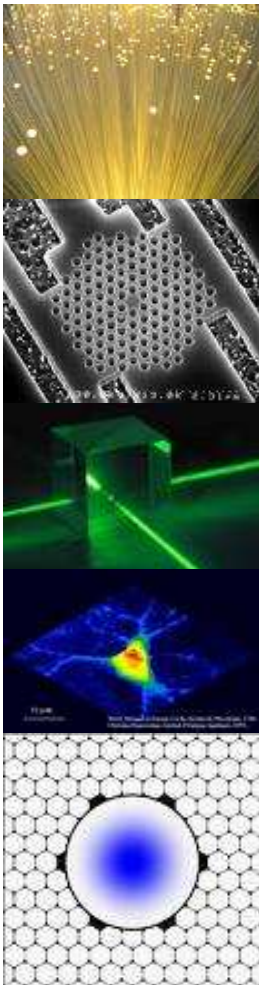
Partner countries
Spain, France, Poland,
Finland, Germany





**“Light is energy
and it's
also information
- content, form,
and structure.
It's the potential
of everything.”**

David Bohm



First results of the market survey

A short summary of the PhotonicRoadSME European survey on the potential of photonics and optical solutions for future product development, in particular in small and medium sized companies (SMEs), is presented within this article. The questionnaire for the market survey was developed in order to identify the technological barriers, socio-economic barriers as well as the needs for the industrial uptake of photonics, especially in SMEs. More than 2,000 companies from 9 European countries have been contacted for the survey. All in all, more than 120 answers were collected and analyzed.

Almost all interviewed companies are in fact SMEs. So, only data concerning SMEs was used for evaluation.

More than 80% of the companies involved in the survey have less than 50 employees, with a fair balance between those with less than 10, and those with between 10 and 50 employees. 18% of the interviewees were created after 2005 and will be thus considered as start-ups.

The companies had to specify the application fields of their products within the following sectors: ICT, Health & Well-being, Safety & Security and Environment. In order to allow a more detailed insight into the specific sectors, each main industrial sector was divided into subsectors. All sectors are well represented. Here, it was possible to check more than one answer. Thus, the distribution within the sectors is as follows:

- ⇒ 46 companies declared having ICT as main industrial sector (roughly 43% of them)
- ⇒ 61 companies declared having Environment as main industrial sector (roughly 57% of them)
- ⇒ 37 companies named Health & Well-being as their main industrial sector (roughly 35%)
- ⇒ And 56 companies named Safety & Security as main industrial sector (around 52 %)

Almost half of the companies that answered this questionnaire invest more than 10% of their annual budget on Research & Development. Noticeably, there are also more than 50% of these companies which have more than 20% of their personnel dedicated to R&D. Thus more than half of the interviewees can be considered to be high-tech companies.

Interestingly, the companies who answered the questionnaire work on very different optical products or applications. The companies product categories cover laser and light sources, cameras, optical waveguides, detectors, optical modulators and amplifiers, optical fibres, WDM, optical filters and gratings, microscopes, displays, photovoltaic cells, optical sensors, lenses, mirrors and prisms as well as optical data storage devices and optical labels and security signs.

Regarding the companies' role in the value chain, the main noticeable fact is that among the companies working as developers (96 of them), more than 70% of them (68 comp.) are working on devices. The same goes for producers, where 62 companies out of 83 (around 75%) are actually working on devices as well. On the other side, for the "user" category, companies are pretty well balanced between being users of materials, devices or fabrication technologies.

Regarding the main socio-economic barriers expressed by the companies who answered the questionnaire, the results are as follows:

- ⇒ Price/performance ratio (reduce costs): 62%
- ⇒ Market volume / market acceptance: 39%
- ⇒ Manufacturing of prototypes: 31%
- ⇒ Production process technologies: 24%
- ⇒ Availability of highly skilled personnel: 24%

The most important strategic criteria for companies to decide their future R&D strategy are the as following:

- ⇒ Possible applications / Products: 49%
- ⇒ Market attractiveness: 45%
- ⇒ Costs of materials/devices/fabrication technologies: 43%
- ⇒ Time to market: 36%
- ⇒ Economic potential: 30%

The complete market survey can be downloaded from the PhotonicRoadSME website. (<http://www.photonicroad.eu/index.php5?file=58>)

Results of the technology audits

The technology audits have the aim to identify specific needs and barriers of the SMEs products and how nanophotonics, novel photonic devices and fabrication technologies might help to overcome these barriers. Furthermore, the companies' view on photonics, their main strategic criteria for the near future, their innovation management capabilities as well as their awareness on R&D services and foundries shall be identified and visualised.

Summary of the results:

The evaluation results of the technology audits show good accordance to the results of the market survey. Here, also the main barriers were stated as high costs for materials, devices and, especially, manufacturing and fabrication technologies. Also, the lacking possibility to produce small lot sizes and be more flexible in the manufacturing process is stated as a big challenge for European SMEs. Despite the fact that many companies know R&D services and foundries (mainly universities and research centres they are collaborating with), the bigger part of the companies (~ 80%) does not use nano-related fabrication processes. The companies also stated that high manufacturing costs due to expensive equipment, expensive raw materials and small lot sizes is hindering. Also, an improvement of fabrication processes in regard to time to market and the possibility to get access to high-quality test and measurement equipment is desired by the interviewed companies. The companies think that high equipment costs as well as complexity of the technology behind might be hindering for the uptake and adoption of photonic technologies and nanophotonics for their products.

Regarding the strengths of their products, the companies are optimistic and stated that the technological level of their applications and products are high and fit the customers' needs on the whole. Also, feedback from the customers as well as other sources of information gathering (technology and market surveillance) forces the SMEs to adapt and continuously improve their products' performances and properties to stay competitive. Also, niche markets and very individual products assure the companies' competitiveness on the European market.

The results of the technology audits can be downloaded from the PhotonicRoadSME website. (<http://www.photonicroad.eu/index.php5?file=58>)



“Photonics encompasses the generation of light, the detection of light, the management of light through guidance, manipulation, amplification, and most importantly, its utilisation for the benefit of mankind.”

Pierre Aigran

SWOT analyses of the four industrial sectors “ICT”, “Environment”, “Health & Well-Being”, and “Safety & Security”

Based on the knowledge and accumulated data from the market survey and technology audits as well as already existing reports, the PhotonicRoadSME project will produce four SWOT (strengths/weaknesses/opportunities/threats) analyses for the four industrial branches

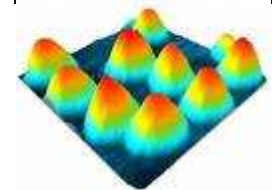
- ⇒ ICT
- ⇒ Environment
- ⇒ Health & Well-Being
- ⇒ Safety & Security

These reports will provide an overview about the specific needs and opportunities of SMEs in regard to their (photonics) product development. Furthermore, they will highlight possible solutions to overcome existing technology and socio-economic related barriers through novel photonic devices and nanophotonic materials as well as threats that might be linked to these opportunities.

These SWOT reports will be validated by an Expert Panel Meeting that will be held on 15th June 2009 in Munich, Germany, during the World of Photonics Congress 2009. Here, 12 photonics' experts will gather to discuss, validate and complement these 4 SWOT analyses before they will be compiled to one final report. Also, the 4 individual SWOT analyses will be of course be incorporated to the PhotonicWiki (<http://www.photonicroad.eu/quadi/phase3/>) where it can be refined and further discussed.

The information gathered for the SWOT analysis will support the roadmapping process within the PhotonicRoadSME project, which will start in May 2009.

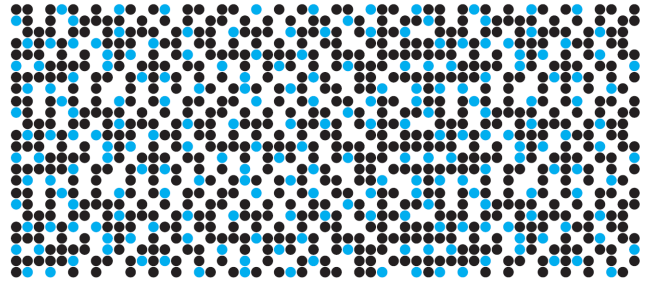
The complete SWOT analyses will soon be available for download from the PhotonicRoadSME website. (<http://www.photonicroad.eu/index.php5?file=58>)





Photonic Road SME

Development of Advanced Technology Roadmaps in Photonics and Industrial Adaption to SMEs



PhotonicRoadSME database

The PhotonicRoadSME database is now finished and will be used to handle the numerous categories of nanophotonic materials, novel photonic devices and fabrication technologies as well as their applications and application fields within the four industrial sectors. The materials, devices and fabrication technologies are hereby interlinked with each other for better visibility.

The database was developed in a holistic approach in order to dynamically visualise the roadmaps for materials, devices and fabrication technologies. Thus, it is possible to insert modification in order to keep the information updated continuously. Specific roadmaps can be extracted from the database, e.g. branch-specific roadmaps, SME-type specific roadmaps or roadmaps for individual search criteria thus allowing to create individual roadmaps for each individual SME.

An exemplary roadmap is demonstrated below.

The PhotonicRoadSME partners are right now filling the database with information about nanophotonic materials, novel photonic devices and related key fabrication technologies. Then, in end of May 2009, the roadmapping process and the development of 3 SME-type (developer, producer, user) specific as well as 4 industrial sector (ICT, Environment, Health & Well-Being, and Safety & Security) specific roadmaps will be conducted. This will ensure that SMEs with very different goals and sales markets get accurate information about the main developments currently happening in their photonics domain as well as those expected to come.

These developed roadmaps will serve as a useful tool to get to know the state-of-the-art in photonics as well as to take a look in future developments.

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LEVEL OF DEVELOPMENT

Legend:	LEVEL OF DEVELOPMENT																							
	Technological Invention				Laboratory Prototype				Industrial Demonstrator				Industrialisation				Market Entry							
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AZO31kg bulk metamaterial																								
Photonic Crystal Fiber PhC-1550-01																								
2D DNA lattice																								
3D Photonic Crystal with designed point defects																								
4-(diphenylmethyle)-2-hydroxy-1,1,7,7-tetramethylololody ...																								
Ag on glass cut-wire plate pairs																								
AgMgF2 fishnet structure																								
AgTiO on glass Complementary Split-Ring Resonators (CSRRs) ...																								
AgTiO on glass Split-Ring Resonators (SRRs)																								
Al on Mylar substrate Y shaped resonators																								
Alumina (Al2O3) - bulk material with nano-grains																								
Bulk metamaterial composed of silver (Ag) nanowires																								
Carbonides coatings and Related Materials																								
Erbium-Doped Photonic Crystal Fiber																								
Example standard material																								
Gold (Au) - Nanoparticles																								
Iron (carbon coated) (Fe-C) powders																								
Liquid Core Photonic Crystal Fiber																								
MEH-PPV / CSO nanostructured films																								
Non-linear Au Thin metamaterials fabricated on ErAs/GaAs ...																								
Platinum tetraphenylbenzenesulphurim [Pt(TBPB)]																								
Poly(ethyl alcohol) (PEA) thin-film nanopatterned																								
Polyfluorene/Polyaniline(PF / PANI) nanostructures																								
Silicon on Insulator (SOI) technology																								
Solid Core Photonic Crystal Fiber filled with Liquid																								

