

11.Nanotechnology in Europe

“Nanoscience and nanotechnologies: an action plan for Europe 2005-2009”. This plan highlights the following nanotechnology areas: _ nanoelectronics, including nanomanufacturing and nanoinstrumentation _ nanobiotechnology and nanomedicine, including diagnostics, targeted drug delivery and regenerative medicine _ nanomaterials, nanoparticle technology _ health and environmental risks of nanotechnology

Germany: 320 MEuro/yr on nano in 2004 Nanotechnology in Germany is focused on nanoelectronics (46 MEuro/yr), nanomaterials (38), nano-optics (26), microsystems (10), ICT (3), nanobio (3) and manufacturing (2). Nine nanotechnology competence centers have been founded: Nanomaterials (Karlsruhe), Ultraprecision surface engineering (Braunschweig) and nano coatings (Dresden), Nanooptics (Berlin), Nanobiotechnology (Munich and Kaiserslautern), Nanochemistry (Saarbrücken), Hanse Nanotec (Hamburg); CeNtech (Münster) UK: 130 MEuro/yr on nano in 2004 After the National Initiative on Nanotechnology (NION) and LINK nanotechnology program (LNP), both ended in 2002, the UK launched in 2003 the Micro and Nanotechnology Initiative (MNT) to create a network of micro and nanotechnology facilities. At present the UK has 1500 nanotechnology workers. Well recognized nanotechnology centers are at the universities of Oxford, Cambridge, Newcastle, Durham and Glasgow. A special nanomaterials production facility is present at Farnborough, run by QinetiQ. Inex, innovation in nanotechnology exploitation, offers a one-stop-shop facility for micro- and nanosystems including production facilities.

France: 250 MEuro/yr on nano in 2004 The French research structure for nanotechnology is based around a group of five centers of excellence. This network covers the facilities at CEA-LETI in Grenoble (centered on Minatec, which brings together the CEA, the CNRS, the Institut National Polytechnique and the Université Joseph Fourier); the Laboratoire d'Analyses et d'Architectures des Systèmes (LAAS) in Toulouse; the Laboratoire de Photonique et de Nanostructures (LPN) in Marcoussis; the Institut d'Electronique Fondamentale in Orsay (IEF) (centered on Minerve) and the Institut d'Electronique, de Microelectronique et de Nanotechnologies (IEMN) in Lille. Priorities are: _ micro & nanoelectronics _ opto-electronics _ microsystems and assembly _ biotechnology and instrumentation

Netherlands Nanotechnology is considered crucial for the high tech industry in the Netherlands, not only for the multinationals such as Philips, ASML, ASMI, DSM, AKZO-Nobel but also for a large number of small and medium sized companies. Three programs are now ongoing. 30 NanoNed NanoNed, is an initiative of eight knowledge institutes and Philips. It clusters the nanotechnology and enabling technology strengths of the Dutch industrial and scientific infrastructure. The total budget for this NanoNed program amounts to 235 MEuro (4 years). The program has so called flagship projects on: _ advanced nanoprobe, nano-instrumentation _ chemistry and physics of individual molecules _ bionanosystems _ bottom-up nanoelectronics, nanoelectronic materials _ nanofabrication, nanofluidics _ nanophotonics, nanospintronics

MicroNed The MicroNed program integrates Netherlands R&D on microsystems. The budget amounts to 54 MEuro (4 years). It has the following clusters: _ micro invasive devices; micro life, lab-on-chip _ distributed sensor and actuator systems; autonomous sensors for harsh environments _ smart microchannel technology; modeling and design of microsystems _ microsatellite _ microfactory

The Holst center was founded in 2005 by IMEC (B) and TNO (NL) in order to valorize nano- and microsystems technology into innovative products. It has two technology programs: _ system in a package: wireless, autonomous sensors _ system in a foil: flexible electronics in a foil for lighting, sensors, tags and energy

The center has received a 50 MEuro grant from the Ministry of Economic Affairs. It is an open innovation center and industrial partners can sign in and participate in the technology programs.

Technology radars One way of ordering and structuring this nanolandscape is to plot technology radars. Technology radars are radial plots with the radius as timeline, usually 15 or 20 years, towards market readiness. The radar circle can be divided into three or four segments covering the following application domains: _ ICT, information and communication _ energy or power _ bio and life science _ materials and manufacturing

In this chapter nanotechnology

radars are being proposed for eight application domains in both the military and civil world: _ human centric: soldier, first responder, medical, sport _ vehicles: land vehicles, automotive _ marine: naval, maritime _ aerospace: missiles, fighters, aero planes _ space: satellites _ weapons and law enforcement _ logistics _ security and surveillance 31

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