

Activities in Nanomedicine in Romania

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I. ABSTRACT

IMT-Bucharest coordinated the national project “NANOPROSPECT: Nanotechnologies in Romania, a prospective study” (October 2010 – May 2011), whose objective was to put forward strategic orientations and recommendations for a national strategy for nanotechnology, in correlation with the EU strategy. This strategy, apart from the priority research directions, will suggest measures to accelerate innovation, industrialization of R&D results, full use of experimental facilities, multidisciplinary training and the responsible development of nanotechnologies. The “nanotechnologies” theme was approached in the R&D national plans starting 2000, but there was no continuity and focus on the viable thematic areas. There is a need for a plan that would concentrate the research for specific domains with critical mass and interest from industry and society and also a critical need for a strategy that would cover all the important aspects for the development of nanotechnologies at national level.

The project developed databases for collecting information related to Romanian potential in the domain (in terms of organizations, groups and specialists with expertise and results in nanotechnology fields, infrastructures, projects, equipments, scientific papers, patents, products, technologies, courses). These databases, available in English, assure transparency and information exchange, as they are public, interactive and relational, facilitating cooperation at national and international level.

The analysis of human resources in the domain showed the needs for a multidisciplinary education at various levels and interdisciplinary training by research, the need to support the young researchers and specialists returned in the country after performing long term studies or research activities abroad. The interaction between education, research and industry is essential for the improvement of human resources training, in order to assure the technological competitiveness.

“NANOPROSPECT” inventory showed the existence of approximately 300 equipments devoted for nanotechnology at national level and the most efficient way to benefit from the equipments could be the set-up of experimental facilities networks.

A selection for the domains with active and multidisciplinary communities is necessary and an innovative ecosystem can be created, based on a critical mass and on competitive advantages.

One of the key strategic priorities proposed by “NANOPROSPECT” is “**Nanomedicine**”, the application of nanotechnology to achieve breakthroughs in healthcare.

The data collected in the project and from other previous interactions with the main players in the domain revealed a great capacity, involvement and interest for developing the nanomedicine field in Romania. Approximately 40 Romanian organizations (research institutes, universities and SMEs) and 120 specialists are active in nano-biosystems / nanomedicine, developing 60 national and 11 international R&D projects since 2007. They benefit from state-of-the-art equipments, developing products and technologies and also registered 22 national patents.

The cooperation between the main active organizations started in 2005 in the frame of the Romanian nanomedicine network RO-NANOMED, which financed small research projects devoted to the three priority areas of the European Technology Platform (ETP) for Nanomedicine: targeted drug-delivery, diagnostics, regenerative medicine. This network also supported the partial set-up of *NanoBioLab*, a dedicated laboratory in the clean-room area of IMT-Bucharest, which provides an adequate environment and new equipments for the fabrication and testing of microarrays and lab-on-chip devices. Activities in nanomedicine are mainly developed at IMT by two laboratories from the Centre of Nanotechnologies (under the aegis of the Romanian Academy). *The Laboratory of nanobiotechnologies* is involved in projects related to the development of microfluidic chips on silicon for electrophoretic separation of DNA fragments and PCR amplification, development of substrates for alternatives methods of diagnosis base on microarray technology, multifunctional nanoparticles for drug delivery and *the Laboratory of molecular nanobiotechnology* develops Silicon-based lab-on-chip devices, bio-sensing devices for real-time detection.

Some of the Romanian research organizations are members of the ETP NanoMedicine, contributing to the activities developed in the platform and attending events and meetings of the working groups they are involved in. IMT-Bucharest is representing Romania in the Mirror Group of platform, promoting the potential for international cooperation of the Romanian institutions.

Transnational projects in nanomedicine with Romanian participants could be supported by EuroNanoMed ERA-NET initiative, where Romania participates as partner. This initiative fosters the competitiveness of European nanomedicine players through the support of collaborative and multidisciplinary Research and Technology Development (RTD) projects with participants from academia, clinical/public health communities and industry.