

# Historical Development Trends of the Nanotechnology in Latvia

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## Abstract

The current scientific document is prepared on the ongoing results summarized by the authors from the analysis on the data and found correlations between the scientific activities, political platform development and dynamics of the investment activities concerning latest trends of development of nanotechnology in Latvia since the country regained independence.

*Keywords:* advanced technologies in Latvia, innovation, nanotechnology, research and development.

## Introduction

In the frame of the current multidisciplinary scientific project “Development of multifunctional nanocoatings for aviation and space techniques constructive parts protection”, the scientists determined the following aim of the research: to develop the engineering economical indicator system for multifunctional nanocoatings technology. Therefore, a scope of the scientific study inhales the research on both the scientific and commercialization aspects.

For the current scientific conference the authors have prepared the ongoing results from one of the investigation phases of the research that is a study on the historical and statistical data with a purpose to identify the development trends of the nanotechnology in Latvia.

High speeds of development of the advanced technologies in the world make tough competition between the countries. The research problem of understanding of the resources and capacities of the Latvian nanotechnology market cannot be unilaterally solved. This concerns the issues of the scientific staff capacities and competitiveness, technological infrastructure, government involvement, support of the financial institutions, the local market production capacities and many other aspects. Therefore, the authors applied an unbiased approach to a review of the nanotechnology evidence issue in Latvia (Staube et al., 2014b).

## Methodology of Research

To carry the research the authors applied the following methods: logical approach and analysis of the primary and secondary literary sources, including official documentation from the local legislation approved by the Cabinet of Ministry of the Republic of Latvia and the Ministry of Education and Science of the Republic of Latvia, the databases of the European Community Research and Development Information Service of the European Commission, the World Intellectual Property Organization, European Patent Office and the Patent Office of the Republic of Latvia; the scientific and professional literature sources; including Thomson Reuters Web of Science, Elsevier ScienceDirect and SCOPUS research platforms; latest statistical and historical data, including European statistical database EUROSTAT and central statistical organisations databases of the Baltic States.

## Findings/Results

Already in the early 1960-ies a Bureau of the vacuum metallization design had been established in Latvia and later production of vacuum coating systems started. According to the Society of Vacuum Coaters, that happened in the same decade period with the pilot projects on ion sources for space propulsion in NASA (Mattox, 2003). After regaining the independence in Latvia, a development of the activities platform of the legal environment for the advanced technologies as well as the indexes of production of the high-technology manufacturing industries have been gradually recovering until now excluding a period of an economy slump in 2008-2009. Obviously, the political changes caused a resonance in scientific activity. The Law regarding the scientific activity dated by 1992 has been already updated in 2005. The Entrepreneurship competitiveness and innovation programme for a time period of 2007 to 2013 was approved by the Cabinet of Ministers of Latvia in the middle of 2007 (Staube et al., 2014b). The political platform in support to nanoscience has been permanently developed since 2001 by approve of the National Innovation Concept. Recently the research

priorities and financing have been revised, and for the further years of 2014-2017 development of nanotechnology is moved to the second top place or higher position that must be influenced by our country's joining the smart specialization platform of the EU.

Referring to the Table 1, there is a certain correlation found between the financial flows of the projects on development of nanotechnology and the scientific activities in Latvia.

**Table 1.** Yearly dynamics of nano-related projects financial flow and scientific activities in Latvia, from 2002 to 2013 [authors' calculation]

Year	Dynamics of local share in nanoscience generation <sup>2</sup> , correlation to previous year	Dynamics of financial flow of nano-related projects <sup>2</sup> , correlation to previous year, in million euros
2003	0.69	0.13
2004	2.29	1.66
2005	0.23	1.58
2006	3.40	0.35
2007	-4.09	-1.41
2008	1.65	-0.39
2009	1.34	0.69
2010	0.26	0.99
2011	-0.37	-1.26
2012	2.14	0.05
2013	-2.09	-0.98

<sup>2</sup>Note: authors' calculation is made on data from Staube et al. (2014b)

According to the research results, there are also other indicators determining an activation of the investors' interests to nanoscience in Latvia. In recent years a major financial support to Latvia is assigned by the European Union. Our country has very high index of the international collaboration concerning development of nanotechnology (Staube et al., 2014a), and is listed among the "Modest innovators" (European Commission, n.d.), and, according to the analysis on the high-technology trade balance and the production volumes in the Baltic States, for a meantime, Latvia is not a leader in the development of high-technology products to the consumer market.

## Conclusions

Despite multifunctional nanocoating technology has almost half century history worldwide and locally in Latvia, currently our country is at the creation phase for the long-term development. Nanotechnology is set to the top of the development priorities of the country driven by the international collaboration of our country and positive outward investments flow.

## References

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