

Nanomaterials patents in Brazil: some considerations

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Progress in the development of nanotechnology has led to a number of initiatives which serve to normalize activities in this area. The risks to human health, the pathways of exposure to nanomaterials in the human body and occupational safety are recent issues which require deeper study.

As this is an innovative technology, there has been a substantial global increase in the number of filings of applications for nanopatents. Such filings of patent applications offer a way of monitoring the production of certain goods and services.

Given this scenario, and the lack of research related to the filing of nanotechnology patents in Brazil, a survey was undertaken of these patents for the period 1991 to 2010. A quantitative approach was used, based on a bibliometric analysis of data gathered in the patents database of the Brazilian National Institute for Intellectual Property (INPI). The search took place in December, 2011, using 18 nanotechnology-related terms. The choice of these terms was based on the INPI-published series, "Alerta Tecnológico", with additional keywords derived from articles dealing with nanotechnology search strategies or bibliometrics. The present survey selected those patent documents which contain in their title and/or abstract at least one of the 18 search terms.

The results obtained were inserted into an electronic table containing the following data: process, date of filing, title of the patent application, name of the person filing, notification, the number and date of the edition of the Brazilian Review of Industrial Property in which the patent filing was noted, and the principal class of the patent request according to the International Patent Classification (IPC).

In order to process and standardize this data, as well as to generate reports which permit more consistent analysis, use was made of an automated data mining tool: the VantagePoint software developed by SearchTechnology and licensed by ICT/FIOCRUZ since 2007.

The object of the search was patent applications filed in Brazil in the period between 1991 and 2010, of which there were 1352, representing 36 countries. Surprisingly, Brazil was in second place, with 380 patents, representing 28% of the total. The USA was in first place, with 425 (31%).

These patents were classified by IPC section, using the methodology proposed by the Organization for Economic Cooperation and Development, which resulted in six groups of patents, distributed as follows: nanomaterials (40.4%), medicine and biotechnology (26.6%), measurement and production (10%), electronics (2.7%), energy and the environment (2.3%) and optical electronics (1%). Around 17% of the patents in question did not fall into the adopted classification.

It was noted that the first filing in nanotechnology present in the INPI database took place in September, 1991, while the last, within the period under study, took place in September, 2010. It was also noted that the number of applications peaked in 2006, probably as a result of the various announcements of the availability of financing for nanotechnology initiatives, offered by the Brazilian institutions FINEP (Financiadora de Estudos e Projetos) and the CNPq (Conselho Nacional de Desenvolvimento Científico e

Tecnológico) beginning in 2003, and which are detailed in publications of the Brazilian Agency for Industrial Development.

The applicants were divided into individuals and companies, with the latter group prominently featuring science and technology institutions, such as universities, university foundations, development and funding agencies and technology institutes, notable for their own unique characteristics.

Of the 546 applications for patents filed in Brazil, approximately 27%, or 150, were filed by Brazilians, of which the main institutions, both located in São Paulo, were the State University of Campinas (UNICAMP), with 17 patents, and the University of São Paulo (USP), with 13. Amongst the 150 patents filed by Brazilians, 85 distinct depositors (without considering partnerships) were identified, which included both individuals and institutions. The majority (33) were science and technology institutions, private companies (29) and individuals (23), disregarding any partnerships. These were present in 11% of the Brazilian patent applications, with most of these involving partnerships between private companies and science and technology institutions.

The 396 patent applications from outside Brazil were filed by 251 different applicants (disregarding partnerships). The profiles of these foreign applicants show that the majority are companies (196) followed by science and technology institutions (36) and individuals (19). 4% of the applications in this group involved partnerships, predominantly between companies.

The foreign companies which most often applied for patents are: Basf SE (Germany) with 24, Rohm and Haas Company (USA) with 19, PPG Industries Ohio, Inc. (USA) with 13, Dow Global Technologies Inc. (USA) with 11, the Goodyear Tire & Rubber Company (USA) with 8 and 3M Innovative Properties Company (USA) with 7.

The current nanoscience and nanotechnology scenario in Brazil is one in which this new technology is being developed by foreign companies. We also observed little presence of Brazilian companies, with mainly Brazilian public institutions amongst the most prominent in applying for patents.

Due to have not yet been epidemiological studies on the potential risks posed by nanoproducts, the population can be exposed to nanomaterials directly or indirectly, after wear or degradation of nanomaterials that lead to the release of nanoparticles, such as in pharmaceuticals, cosmetics, paints, textiles, electronics and fuel. Potential routes of exposure are inhalation, skin absorption (especially with regard to cosmetics), ingestion and injection.

The deepening of the present study aims to support the scientific debate on issues for the development and application of such products, generating benefits for the future formulation of public policies in order to adapt and modernize the regulatory framework on hazards involving nanomaterials, such as the strategic policies of Science, Technology and Innovation, as well as the Public Health in Brazil.