ISBN 978-85-63274-02-4

International Conference on Food and Agriculture Applications of Nanotechnologies

Editors:
Caue Ribeiro
Odílio Benedito Garrido de Assis
Luiz Henrique Capparelli Mattoso
Sergio Mascarenhas

São Pedro, SP
2010

1st Edition
1st print: 500 copies

Anais da 1. International Conference of Food and Agriculture Applications of Nanotechnologies – São Pedro: Aptor Software, 2010.
284 p.

ISBN 978-85-63273-02-4

1. Nanotechnologies – Events. 2. Ribeiro, Caue. 3. Assis, Odílio Benedito Garrido de. 4. Mattoso, Luiz Henrique Capparelli. 5. Mascarenhas, Sergio

International Conference on Food and Agriculture Applications of Nanotechnologies

NanoAgri 2010

Impact Assessment of Nanotechnology on Agricultural Science: a Methodological Approach

K. R. E. Jesus-Hitzschky[(1)]* and O. B. G. Assis[(2)]

[(1)] Researcher Embrapa Meio Ambiente, Jaguariúna, SP. Brazil. Rodovia SP 340 km 127,5 CP 69 CEP 13820 - Phone: 55 (19) 3311-2641; Fax: 55 (19) 3311-2640 katiareg@cnpma.embrapa.br
[(2)] Researcher Embrapa Instrumentação Agropecuária, São Carlos, SP. Brazil. Rua XV de Novembro, 1452 – CP. 741 CEP: 13560-970 – Phone: (16) 2107-2800 odilio@cnpdia.embrapa.br
* Corresponding author.

Abstract: The investigation of the effects of nanotechnology on the quality of life of the population through level-headed consults to specialists will allow answering relevant questions about environmental impacts of nanotechnology and about the use and destination of its products and wastes. We present herein a method for assessing the impacts of nanotechnology based on indicators, components and sub-components. This methodology includes validating the indicators and methods created based on the advice of specialists in nanotechnology and related areas. The project also includes the development of software to facilitate using the proposed methodology.

Nanotechnology provides the perspective of great advances in production and process, mainly in agriculture area, what undoubtedly will promote an improvement of life quality and reduce impacts on the environment. In spite of a progressive increasing in the use of nanotechnologies worldwide, their potential is still repressed in Brazil, due to the early stage of the local development and the lack of specific methodologies that make impact assessment into a current practice. Therefore, the development of a methodology for the *assessment of nanotechnology impacts* is an effective mitigatory measure to face the growing challenges pointed out by scientists and legislators related to environmental degradation, ethical and social issues. This methodology could be used in three different purposes: alerting, monitoring and restoring.

The present study aims at creating and validating an impact assessment methodology based on technical data available about technology usage found in the literature, which could be employed as a guide to ex-ante or ex-post evaluations of nanotechnology uses and its implication in the environment exposure.

The identification of potential impacts indicators of nanotechnologies were based on a survey in the specialized literature, where the focus was to gather the most relevant information useful to general public and scientists and decision makers of the public sphere. One hundred indicators were selected, sorted into four scopes: a) Environmental and Health Scope; b) Social, Ethical and Institutional Scope; c) Economic and Political Scope and, d) Science, Technology and Innovation Scope.

In order to validate those indicators, they were organized as questions according to the format of the Delphi Method of Specialist Consults [1]. The Delphi Method consists basically in a consult, by means of a systematic, multi-level questionnaire, to a limited and selected group of specialists, who through proved knowledge in the area, experience and objective information exchange seek to achieve consensual opinions about complex issues. The questionnaires created to represent the impact indicators of nanotechnologies, according to the Delphi Method, were structured in such a way so as to make them available at the website of *Embrapa Meio Ambiente*. The questionnaire was created with MySQL-Front and HTML databases dynamically generated by PHP. Finally, the data were exported from MySQL-Front for posterior tabulation and analysis. The questionnaire is available at the link: http://www.cnpma.embrapa.br/nanotec1 with the password: impactos-nano.

In the current stage of this study we expect gathering information collected during the remote round and the methodology proposed in the face-to-face round. This methodology will enable developing the software Impacts-Nano, which will be an alternative to assess the impacts of nanotechnologies.

[1] LINSTONE, H. A.; TUROFF, M. **The delphi method: techniques and applications. Addison Wesley.** Publishing Company, Massachusetts, 1975.