

3rd Annual Conference and Expo on

BIOMATERIALS

March 05-06, 2018 | Berlin, Germany

A proposal for a technological roadmap of nanocellulose

Moises de Souza Gomes¹, Brazil Estevao Freire² and Maria de Fatima Vieira Marques¹¹IMA-UFRJ, Brazil²EQ-UFRJ, Brazil

The search for increased value products from the commodity paper and cellulose industry found on nanocellulose – a high performance nanoscale biomaterial discovered by Turbak, Snyder and Sandberg in the ITT Rayonier Labs (New Jersey, USA) in 1978 – an opportunity to reach more profitable markets, such as advanced composites for the auto industry, flexible OLED screens, pharma formulations or advanced biomedical therapies. To understand the evolution of this 40-year technology, and the progress towards industry/commercial applications, the analysis of patent and scientific articles becomes a key information to future investments and efforts towards new nanocellulose-based frontier materials. The purpose of the present study is to propose a technological roadmap of nanocellulose to understand in which direction in which this technology is heading. Patent data search used Questel Orbit and Thomson Reuters' Derwent Innovation Index from Web of Science databases. Scientific articles search used Scopus and SciFinder databases. All gathered information was classified with the following hierarchy: 1. Type of nanocellulose (Nanocrystalline, nanofibrillated or bacterial nanocellulose; 2. Subject (Production process or chemical modification/application); and 3. Country of origin. This classification occurred after a detailed analysis of each searched document. A further analysis associated the documents with a target market/application, creating a table relating it with the type of technology used. The proposed technological roadmap was then created quantifying the tendencies with the industry investments, creating a most probable scenario of the future of nanocellulose and its applications for the mid and long term. Although the early use of nanocellulose, as nanofibrillated cellulose, focused on nanocomposites and their use as rheology modifiers, the new chemical modification methods of bacterial nanocellulose shifted the interest of this material on sophisticated biomedical applications, as well as to nanocrystalline cellulose, with high performance use in photonics and advanced electronics.

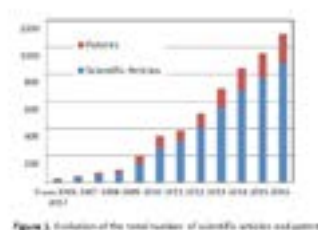


Figure1: Evolution of the total number of scientific articles and patent deposits/granted patents from 2006 to 2017

Recent Publications

1. Oksman K, et al. (2016) Review of the recent developments in cellulose nanocomposite processing. *Composites: Part A* 83:2-18.
2. Milanez DH, et al. (2014) Technological indicators of nanocellulose advances obtained from data and text mining applied to patent documents. *Materials Research* 17(6):1513-1522.
3. Milanez DH, et al. (2013) Assessing nanocellulose developments using science and technology indicators. *Materials Research* 16(3):635-641.
4. Charreau H, Foresti ML and Vazquez A (2013) Nanocellulose patent trends: a comprehensive review on patents on cellulose nanocrystals, microfibrillated and bacterial cellulose. *Recent Patents on Nanotechnology* 7(1):56-80.
5. Klemm D, et al. (2011) Nanocellulose: a new Family of nature-based materials. *Angewandte Chemie International Edition* 50(24) 5438-5466

3rd Annual Conference and Expo on

BIOMATERIALS

March 05-06, 2018 | Berlin, Germany

Biography

Moises de Souza Gomes is a patent examiner at the Polymer Division of the Brazilian Patent and Trademark Office and a Ph.D student on Polymer Science and Technology at IMA-UFRJ, under the advisory of Professor Maria Marques. His experience on the field of applied technology in the energy industry, especially renewables, led him to study alternative materials for the packaging and biomedical industry. He has led several projects with international corporations, institutions and government agencies in the field of chemistry and energy. With a B.Sc. in Chemical Engineer, and M.Sc. in Polymer Science and Technology, he has also expertise on technology, project and process analysis

moises@ima.ufrj.br

Notes: