DesignCell

"Designed Cellulosic Nanostructures"

Project Start Month: October, 2007

Project Duration: 36 months

Project Consortium

Project Coordinator

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Project Partners

Helsinki University of Technology (TKK), Forest Products Chemistry

Vuorimiehentie 1, 020 15 Espoo, Finland

Helsinki University of Technology (TKK), Engineering Physics and Mathematics

Rakentajanaukio 2c, 020 15 Espoo, Finland

Royal Institute of Technology (KTH), Fibre and Polymer Technology

Teknikringen 56, 100 44 Stockholm, Sweden

Institute Charles Sadron, Université Louis Pasteur (ICS)

6, rue Boussingault, 670 83 Strasbourg, France

Project Objectives

The over-all objective of DesignCell is to design new cellulosic nanostructures for new potential high-tech applications such as intelligent surfaces, templates for sensors, scaffold for biodevices, multilayer-based high flux non-fouling membranes, optically active/conductive devices for organic electronics and membranes. The project encompasses one project for the production of tailored nanocellulose (WP1), one project for fundamental understanding of nanocellulose-polymer interactions (WP2), and three projects devoted to various high-tech products. The specific role of the partners are given in the specified workpackages.

Structural control (methodology) will be obtained by chemical modification allowing some degrees of self-assembly or by multilayering techniques. Commercialisation is helped by development of both low and high-end applications, though this project primarily aims at the high-end of the market (see background).

Project Approach

The DesignCell project is devided into 6 work packages:

Work package 1 (STFI-Packforsk)

In WP1, nanocellulose of different types will be developed. Focus will be to produce tailored nanocellulose.

Work package 2 (TKK, Forest Products Chemistry)

Work package 2 will focus on fundamental understanding of nanocellulose-polymer interactions for diverse applications, especially low-end applications.

Work package 3 (TKK, Engineering Physics and Mathematics)

Work package 3 will focus on self-assembly and formation of aerogels/xerogels which will be used in new types of high-end applications.

Work package 4 (KTH)

Work package 4 will focus on formation of films composed of nanocellulose and polyelectrolytes.

Work package 5 (ICS)

Work package 5 will develop multilayer-based high flux non-fouling membranes.

Work package 6 (STFI-Packforsk)

Work package 6 will handle the coordination and dissemination of the project.

Expected Project Impact

The objective of the project is to develop design strategies for nanocellulose and propel the development of demonstrators for applications in the high-end of the nanocellulose market.

The project will also investigate physiochemical properties of nanocellulose to enable large scale manufacturing for products useful when low-end applications emerge in, for instance, the forest products sector. Such applications will ultimately depend on low manufacturing costs of nanocellulose. Hence, the strategy is to pave the way for low-end applications by securing high-end applications to enable up-scaling of manufacturing plants. The project will, hence, open up for small scale business opportunities and ventures. The societal contribution is new environmentally adapted high-tech products. The more substantial economic and environmental contributions will be realized, when low-end, large scale applications appear. Such applications will surface when design principles of nanocellulose have been developed so product performance can be optimized. At this point in time the project is primarily technology driven, whereas it is expected that market opportunities will be more apparent when manufacturing of nanocellulose starts.

Dissemination is initially targeted by publications in peer-review scientific journals.

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