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**Research area: Process aims**

Pulp production // Pulp treatment

**Key words:**

microfibrillated cellulose, nanocellulose, graphical papers, paper and paperboard, speciality papers, nanoparticles

**TITLE:****Scale-up Nanoparticles in Modern Papermaking (SUNPAP)****Background/Problem area**

Europe is still at the moment the most attractive market place for paper products, due to the size of the markets and relatively high average market prices. In order to increase growth, the European paper industry has to beat the product commoditization trap and renew its product base with more value-added products to gain competitive advantage against the low-cost commodity producers in countries with lower cost structure. Within SUNPAP 23 partners from industry and research institutes working together to in order to establish pilot-lines to introduce the preparation and application of cellulosic nanoparticles in different papermaking processes. The main problem is that results from basic research indicate a very high potential for new industrial processes and products but the technical transfer into practice is not yet solved.

The European SUNPAP (Scaling Up Nanoparticles in Modern Paper Making) project aims to demonstrate that it is possible to manufacture high-quality functional paper and packaging products on a pilot scale by using flexible, energy-efficient and environmentally friendly processes. Nanocellulose is being researched globally, primarily at the laboratory scale. With the SUNPAP Project, the intention is to take research to the next level – to pilot scale and all the way through to the end product.

**Objectives/Research results**

The project will update the current processes of paper manufacture and coating and identify new product opportunities through the use of functional fibre-based materials instead of synthetic petroleum-based materials. The benefits include independence from oil prices, lighter products and the creation of new functionalities and applications in the future. The new coating techniques will allow material-efficient, thin layers to be spread across the paper surface. The main targets are:

1. Development and up-scaling of novel processes for the energy efficient production of nanomaterials, namely NFC, in pilot scale.
2. Development and up-scaling of NFC modification processes to address the challenges of papermaking and to provide added-value active functionalities.
3. Building and demonstration of pilot lines to alleviate take-up of nanotechnologies, both for the production and the utilisation of NFC, to the modern papermaking processes.
4. Exploitation of innovative sustainable solutions for the whole paper industry value chain by integrated sustainability assessment approaches based on economical, social and environmental impact assessments.
5. Risk assessments to guarantee the safe introduction of nanotechnologies in the whole value chain of traditional industrial paper production processes and final paper based products.

The project aims to promote the competitiveness of the forest industry and create new products and markets. This will benefit paper manufacturers and the packaging industry, as well as the consumers of fibre-based products.

**Application/Economic benefits**

By utilizing the properties of NFC innovative, recyclable and bio-degradable fibre-based products, which exhibit properties well beyond state-of-the-art, can be created. NFC's have the novel potential to influence the cost efficiency of the coating process as well as the coated paper quality. The variety of potential applications of these innovative fibre based products is quickly expanding. A number of applications such as organic and printed electronics are already at the market or in the entry phase and according to some estimates the markets for these products alone could value as much as 200 billion € by 2025. Other possible applications of NFC based products include high performance recyclable, anti-smog air filters, which are made from non-renewable resources today, and capacitor and insulator papers used in the electronics industry, where NFC based papers can yield not only performance improvements but also advance the environmental friendliness of the products through improved recyclability.

Because the European paper industry sector is still very fragmented and it consists of a large number of small mills, the NFC based processes developed in the project are also especially suitable for rebuilds of smaller paper mills to change and modify production orientation into more competitive processes and products. The increase of the production flexibility will ensure long term competitiveness.

**Period of time: 01.07.2009 – 30.16.2012**

**Remarks**

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