NEWSLETTER
OCTOBER 2012

PROJECT OVERVIEW

NanoOnSpect aims to meet a fundamental technological challenge in the compounding of polymer nanocomposites to obtain better control on the dispersion of nanoparticles in the polymer matrix. In order to achieve this goal, NanoOnSpect partners are working together to develop a unique piece of high-tech machinery which will provide access to an advanced process control system for nanocompounding.

After one year of collaboration, the consortium of NanoOnSPect has made considerable progress to deliver the technology in due time. Significant achievements have been made in two areas of the project.

THE NANOONSPECT PROJECT IS PROGRESSING WELL ONBOX SHOWN AT THE PLAST MILAN 2012

"One of the most significant achievements in the first year of NanoOnSpect is a pilot sensor which can measure the thermal conductivity of polymer melts online during processing. This sensor will be included in the onBOX, which was also constructed during the first project year and is now ready for the integration of NanoOnSpect sensors for robust quality control" says Irma Mikonsaari, the coordinator of the NanoOnSpect project.

The consortium consisting of several high-tech SME's has been joining efforts to make new sensors and a new tool which will depend on intelligent adaptive control. Adaptive control is defined as process control which intelligently uses the output after analysing and assessing data over a certain period.

Picture above: Gneuss presented a prototype onBOX at the PLAST 2012 fair in Milan. The PLAST, which is Europe's leading industrial fair, was attended by 50,593 visitors.

MEET THE NanoOnSpect TEAM

NanoOnSpect will be present at the FAKUMA 2012!
16.10. - 20.10.2012 Messe Friedrichshafen, Germany
Fraunhofer ICT: B2B2-2104
Gneuss: Halle A6 Stand 6501

NanoOnSpect: Key Information

NanoOnSpect is an SME-targetred collaborative project funded by the European Commission. It involves 12 partners from 6 European countries, including experts in sensor technology and research organisations. The project aims to accelerate the commercialization of innovative polymer nanocomposites by creating a comprehensive processing solution to quality problems

Funding

The NanoOnSpect project has a total budget of 4.7 million EUR. The project started on 1st of April 2011 and will run untill 31st of March 2015.

Approach in NanoOnSpect

^{on}Box: Development and process integration of several sensors for online measurement of polymer nanocomposites (PNC) properties

New PNC processing technology: Combination of the advantages of two compounding processes. Twin-screw extrusion and Nexxus wetting technology

Intelligent Module: Data obtained from the onBox will be used in an artificial neural network and expert system to control the PNC processing in order to obtain reliable material quality

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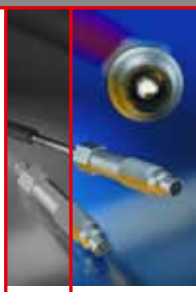
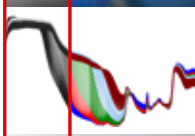
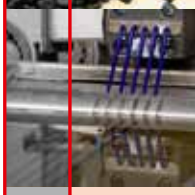



NANOONSPECT TACKLES A MAJOR CHALLENGE IN POLYMER NANOCOMPOSITE COMPOUNDING

There are two main challenges in the production of polymer nanocomposites. The first challenge is related to the production and compatibilisation of nanoparticles. The second challenge, which is addressed by the NanoOnSpect project, is to disperse the nanoparticles in a polymer matrix in the appropriate way.

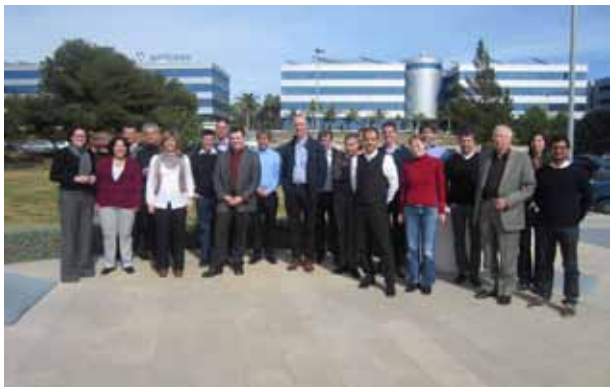
To ensure a effective dispersion of nanoparticles, many processing variables must be monitored, for example residence time, liquid viscosity, local temperatures and pressure gradients as well as elongational stresses. Therefore it is not surprising that a sophisticated control system is required to govern such a multivariate process.

The most effective system to solve multivariate control problems in real time is termed Artificial Neural Network (ANN). An ANN mimics the mechanism operating in the human brain where uncountable mapped connections, to and from, biological neurons allow for retrieval of the most appropriate response to sensory stimuli. In NanoOnSpect ANN specialists are committed working to develop an expert system able to continuously generate the most appropriate operative response based on the selected signals emanating from the compounding process, on line.

Where conventional characterization methods are used, in which the nanocomposite is only characterized after the compounding step (for example using transmission electron microscopy and material testing), the fine-tuning of the compounding process becomes a laborious process of trial and error.

Furthermore, the dispersion process is very sensitive to process conditions, such as pressure, local shear stresses and other parameters, and it is difficult to produce nanocomposites with consistant quality.

With specific sensor technology, it is possible to receive data on the dispersion status of the nanocompound during production, data which can allow direct adaptive control.



Picture above: NanoOnSpect partners during the General Assembly Meeting at Aimplas, Valencia, March 2012

PUBLICATIONS ON NANOONSPECT

Online Raman spectroscopy for determination of CNT concentration in polymer/CNTcomposite V. Guschin, W. et al. Chops 2012 conference

Twin-screw extrusion of MWCNT reinforced polycarbonate composites: Investigation of electrical and mechanical properties. Mack C. et al, Fraunhofer ICT NanoStruc 2012 Conference

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SEVENTH FRAMEWORK PROGRAMME