NANOMEND

METROLOGY FOR ENHANCED NANO-SCALE DETECTION, CLEANING AND REPAIR

Metrology for enhanced nano-scale defect detection, cleaning and repair

A Collaborative European Research & Industry Project

NANOMEND is a collaborative research and development project for micro and nano scale defect detection and correction on large area substrates. Comprising 14 leading European companies and research centres, the project has received €7.25 million funding from the seventh framework programme of the European Union.

NanoMend aims to develop technologies that can DETECT AND CORRECT MICRO AND NANO SCALE DEFECTS within films that have thickness of one micro-meter or less, without reducing production efficiency.

By the end of 2015 NanoMend will demonstrate the new technologies in two industrial applications: flexible photovoltaics and coated, paper-based packaging products.

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These thin films are routinely deposited on a range of large area substrates, including: the inside of food packaging, flexible solar panels, large area lighting and digital displays.

Defects within these films can reduce the yield, longevity and performance of the products they coat.

Using high precision measurement (metrology) techniques, NanoMend aims to improve product performance whilst simultaneously increasing product resistance and lifetime, thereby resulting in major savings.

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Defect Detection

Defects can occur at different stages in the manufacturing process and can be caused by anomalies, such as contamination and thickness variations in the film. For example, micro and nano scale defects in barrier films can allow water vapour to enter flexible solar modules, degrading them over time. Furthermore, defects may

allow gases to enter or leave food packages, which results in a shorter shelf life. Many thin-film coatings are industrially produced with high speed roll-to-roll systems. These systems require novel high speed and high resolution equipment to detect and correct defects.

NanoMend aims to improve this technology by developing integrated detection, cleaning and repair systems for micro and nano scale defects, which will be integrated within roll-to-roll production lines.

NanoMend will benefit the world class industries in Europe that manufacture high volume products using thin films on large area substrates.

Two distinct pilot lines will be developed in order to demonstrate how NanoMend technologies can be integrated into the paper, packaging and flexible electronics markets. One will be at the Swiss manufacturer of flexible CIGS solar modules, Flisom AG and the other at Tampere University of Technology (TUT), Finland. TUT produce polymer coated packaging products in collaboration with the Finnish paper, packaging and wood products producer Stora Enso.

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Applications

Paper and Packaging

Whilst the need to cut manufacturing costs and address environmental concerns is fuelling a reduction in the volume of polymer used to coat paper and packaging products, thinner polymer films are more sensitive to defects.

By reducing the incidence of defects in polymer films, NanoMend will help to improve the quality of coated paper packaging products, decrease the quantity of polymer used and reduce manufacturing costs.

This is particularly important for food and drinks packaging, as well as for electronic devices embedded in paper products, such as food labels.

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Flexible Photovoltaics

Micro and nano scale defects that occur during the production of flexible solar modules not only degrade their performance over time but lead to the scrapping of high value products.

Developing cost-effective technology that addresses the occurrence of defects without slowing production, will increase the affordability of new solar technologies as well as improving their longevity and reducing waste.

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European Consortium

Research Partners

The University of Huddersfield – United Kingdom

Centre for Process Innovation Limited – United Kingdom

Lappeenranta University of Technology – Finland

Tampere University of Technology – Finland

TNO – Netherlands

Fraunhofer Gesellschaft - Germany

National Physical Laboratory – United Kingdom

Kite Innovation (Europe) Limited – United Kingdom

Industrial Partners

Stora Enso – Finland

ISOVOLTAIC – Austria

Flisom AG – Switzerland

IBS Precision Engineering BV – Netherlands

Microsharp Corporation Limited – United Kingdom

ISRA Vision AG – Germany

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