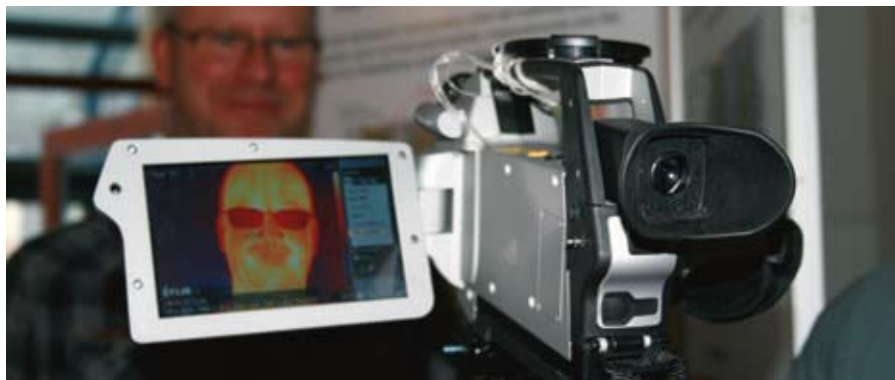


## Have you changed address?

Let us know by sending an e-mail to [info@stfi.se](mailto:info@stfi.se).

# B



An infrared camera clearly illustrates the variations in temperature in different sections of a picture.

# New investments give STFI-Packforsk unique expertise

### High-speed infrared camera for thermal imaging

Local variations in moisture that occur during the production processes of paper and board can cause problems in the final product, such as cockling and waviness. With the new STFI-Packforsk high-speed infrared camera, it is possible to find out what is causing the variations in moisture, for example, by measuring the drying process during actual processes, such as paper production, the gluing of corrugated board, coating and printing, among other things.

“We’re hoping to develop a unique measuring technique for detecting moisture variations,” says Hannes Vomhoff who is responsible for the investment.

An infrared camera shows what the eye does not perceive and clearly illustrates the variations in temperature in different sections of a picture. This is of great interest, especially for the drying process, since moist areas in a picture clearly stand out as some degrees cooler. In such a way, the reasons for the variations in moisture during paper

production can be examined on-line on the paper web by means of varying the process conditions and then measuring the variations in temperature at high speeds, in and at the end of a drying section. However, this demands being able to measure variations in temperature at a high speed. ●

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### Rapid structure identification with high resolution masspectrometry

STFI-Packforsk has invested in a high resolution masspectrometer, which is a powerful instrument for chemical analyses of organic compounds.

“With this instrument, it is possible to measure very low levels of substances and small differences in molecular weight and, as a result, be able to identify organic structures quickly,” says Anna Jacobs, Group Manager for Chemical Analysis at STFI-Packforsk.

The biorefinery and product safety are two areas where the investment is going to have many positive effects.

Pierre Ljungquist, who is expert in this field at STFI-Packforsk, comments, “We’ve noticed a clear trend, where purchasers are making ever increasingly higher demands on product safety. With high resolution masspectrometry as one of the tools we use, we can expand our cooperation with companies to facilitate their contacts with authorities, such as when it comes to more advanced product control.”

Additionally, developments in the new field of biorefineries, where chemical compounds that are of interest have to be identified and refined, will benefit greatly from this new instrument.

The launching of the new masspectrometer will take place in connection with the Chemical Analysis Seminar (see page 7). ●

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## OTHER INVESTMENTS

- Extruder for spinning carbon fibres and bioplastics. This instrument is important for the development of renewable barriers and new lignin applications. Contact: [elisabeth.sjoholm@stfi.se](mailto:elisabeth.sjoholm@stfi.se)
- Spray-dryer for the drying of particles, polymers or similar things that are in water into a fine powder. This equipment will be an important tool in MFC research. Contact: [mikael.ankerfors@stfi.se](mailto:mikael.ankerfors@stfi.se)



### STFI-Packforsk har investerat

i ett antal viktiga instrument som kommer att få stor betydelse för såväl problemlösning som forskning och utveckling av nya material. Bland de senare märks en värmekamera för höga hastigheter som bl a gör det möjligt att online undersöka orsakerna till fuktvariationer vid pappers-tillverkning.

I samband med analysseminariet i april invigs STFI-Packforsks nya högupplösande masspektrometer som är ett kraftfullt instrument för kemiska analyser av organiska ämnen. Två områden där instrumentet kommer att få många positiva effekter är inom bioraffinaderi och produktsäkerhet.

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## New generation of visual materials from Rolling Optics

– an effective tool against counterfeiting

Page 4



Transportation fuels from the forest

Collective resources meeting future needs

Popular forum for laboratory engineers

New investments give STFI-Packforsk unique expertise

## Two new professors at STFI-Packforsk

Since the turn of the year, there have been two new professors at STFI-Packforsk. They are Daniel Söderberg and Mikael Lindström, whose names are not unknown to readers of Beyond.



Daniel is one of the world's leading experts on the forming process in paper production. He has now been appointed as an adjunct professor in fluid dynamics of industrial processes at the Royal Institute of Technology (KTH) in Stockholm.

Gunnar Svedberg, President of STFI-Packforsk, comments, "An important corner stone in our very good collaboration with KTH is the fact that we have researchers who are able to divide their time between KTH and us."



Mikael works in the field of Material Design and has previously supervised and lectured at the University College of Arts, Crafts and Design in Stockholm. On 1 January, 2009, Mikael was appointed as a new professor at this college. This concerns a 3 year guest professorship on a 20% basis in the subject of Interdisciplinary Transference of Knowledge.

Anna von Schenck, Leelo Olm and Niklas Berglin



## Transportation fuels from the forest

### Major progress for cellulose-based ethanol and methanol

When the whole world is striving to reduce the use of fossil fuels in the transportation sector, it is important to find suitable renewable raw materials that can be processed in a sustainable way. Alcohols from cellulose constitute a part of what are called second generation fuels and they can potentially be produced more efficiently than ethanol from grain or sugar cane, for example.

Research on fuel is being carried out at STFI-Packforsk along three main routes. Thanks to close collaboration with the industry, developments have advanced rapidly. "We're looking partly at purifying the methanol that is freed in the cooking process and partly at the methods used in the pre-treatment of cellulose for hydrolysis and fermentation to ethanol. For a long time, we have also been involved in research on the gasification of black liquor into synthesis gas and further refining, for example, to methanol." reports Niklas Berglin, acting manager of the Energy and Mill Systems Group.

#### Purification of methanol from a pulp mill

"You can start with what you already have," says Anna von Schenck, who has been managing a project for the purification of methanol. When the wood is cooked in a sulphate mill, methanol is freed and recovered in the condensate in the plant. However, since it contains sulphur compounds, it does not smell pleasant and contributes to sulphur emissions. To be able to use the methanol as transportation fuel, it must therefore be purified.

The research project arrived at the conclusion that, for a normal sized pulp mill, this method can produce such large volumes that it is possible to replace the fuel for transportation inside the mill as well as all ingoing traffic. In Sweden, for example, this could mean a total of approx. 100,000 m<sup>3</sup>/year. Anna continues, "It would moreover be easy to pipe the methanol to the existing car fleet, which would be a big benefit. Then only minor modifications are needed before it can fill the fuel tanks."

#### Ethanol from cellulose

In order to make the fermentation of biomass into ethanol cost efficient, pre-treatment is an important step. The commonest method used is what is called acidic pre-treatment. "In our research work, we've looked at an alkali pre-treatment method instead and obtained very good results," relates Niklas, who, with Leelo Olm and Anna von Schenck, led the work. The group worked for two and a half years with the method and, during the second half of last year, carried out the first mill trial. This went very well

and confirmed the results obtained in the laboratory.

This method is built on techniques common to pulping processes. One possible scenario would be to convert a pulp mill that is under threat of closure into an ethanol production plant. In such a case, the aim would not be to produce wood pulp in the process but to focus completely on extracting biofuel.

"If interest only lies in breaking up the fibres and not creating strength properties, it's possible to cook the pulp a lot more intensely and without sulphur," says Niklas. By this means, two clean products will be obtained in the process, viz. a clean lignin without sulphur



and a stream, mainly containing carbohydrates that can be hydrolyzed and fermented to ethanol. He continues, "With such a clean product, it might be easier to recover enzymes and yeast from hydrolysis and fermentation, an aspect that could keep production costs down for ethanol."

Lignin that is clean and free from sulphur also increases its useful opportunities. For example, it could be used in pellets as fuel, even in small-scale incineration plants that do not have sulphur capture, such as boilers in houses.

One important reason why the development from laboratory scale to a successful mill-scale trial has gone so quickly is the close cooperation that STFI-Packforsk has had with the pilot plant for ethanol production in Örnsköldsvik, where it is possible to test results quickly on a large scale. The work at STFI-Packforsk is now continuing to further optimize the processes. "Up to now, we've used pulp wood in our trials but, in a project being managed by Leelo

Olm, we're looking at the possibility of utilising forest residues and one-year old plants," says Anna.

#### Gasification of black liquor into methanol

Apart from working on the purification of methanol and the production of ethanol, STFI-Packforsk is also involved in a national research programme on black liquor gasification. For this programme, another pilot plant has been of great assistance in advancing the work, namely the black liquor gasification plant connected to SmurfitKappa in Piteå. Niklas comments, "To achieve success in moving from research to implementation in any project, it's essential to bring the best partners from industry and research together. Our network forms an excellent basis for this."

#### Energy & Biofuels Research Cluster

Research work such as this one is of interest for the new Research Cluster on the theme of Energy & Biofuels, which is a part of the new STFI-Packforsk Research Cluster Programme. Niklas adds, "We'll work with both ethanol and methanol in this Research Cluster. It's exciting for us since it's the first time that we've had a cluster with an explicit emphasis on energy."

Since there are industry partners from North and South America in the Cluster, the research work will not only concentrate on traditional raw materials from the Nordic Region, but other ones too, such as eucalyptus. This new Research Cluster is now in its starting-up stage, so discussions are still being held with other partner companies that want to take part in the research being done in this field. ●

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#### När hela världen strävar efter

att minska användningen av fossilt fordonbränsle gäller det att finna bra förnybara råvaror som kan processas på ett hållbart sätt. Motoralkoholer från cellulosa utgör en del av det som kallas för andra generationens biobränslen, och kan potentiellt produceras mer effektivt än exempelvis etanol från spannmål och sockerrör:

Vid STFI-Packforsk pågår forskningen om drivmedel längs tre huvudspår och tack vare det nära samarbetet med industrin har utvecklingen gått fort fram.

–Vi tittar dels på rening av den metanol som frigörs i kokprocessen, dels på förbehandlingsmetoder av cellulosa för jäsnings till etanol. Dessutom är vi aktiva inom området förgasning av svartull till syntesgas och vidare förädling till exempelvis metanol, berättar Niklas Berglin tf gruppchef, Energi och fabrikkssystem.



## New generation of visual materials from Rolling Optics

— an effective tool against counterfeiting

Fredrik Blomquist, Marie-Claude Béland and Axel Lundvall.

Networks that connect people with completely different backgrounds and technologies can be very productive. Inspiration and knowledge from various lines of business make it possible to come up with totally new approaches that give ideas food for growth. In collaboration with STFI-Packforsk and its network of partners, Rolling Optics, a hi-tech SME, developed a whole new generation of visual materials for labels and packaging. These materials can be used to impart a unique look that is very difficult to copy and which can also raise the profile of a brand and make it stand out on the shelves.

As an innovation partner, the strengths of STFI-Packforsk lie in its extensive resources and expertise along the paper, graphic media and packaging value chains. Occasionally, STFI-Packforsk has the advantageous position of participating in the entire process, from concept to final product. In a development project financed by VINNOVA, cooperation between Rolling Optics and experts from several fields of expertise at STFI-Packforsk resulted in the launching of a whole new generation of optical materials. The role of STFI-Packforsk involved not only studying and quantifying different material properties and aspects of converting, but also included evaluating the new technology from a market standpoint. STFI-Packforsk analysed the demand for and applications of the Rolling Optics materials as well as competing products and potential threats.

“To act as an innovation partner and contribute to a company’s growth is unbelievably rewarding. This project is a

brilliant example of being a driving force between cutting edge technology and business,” says Marie-Claude Béland, who is responsible for Product Appearance & Usability at STFI-Packforsk.

“We’ve been a partner to Rolling Optics from early on when the company started, right through to the final production. It’s been extremely fascinating. Collaborating with small and medium companies means a new way of working for us. The decision-making process is faster and the possibility of affecting the direction in which a project is headed makes for a very dynamic interaction,” she states. “When Hjalmar Granberg (STFI-Packforsk) and I had our first discussion with Rolling Optics, we immediately saw great possibilities for our line of business.”

What still remains is to test the materials from a consumer’s point of view, to gain insight into the use of product use in a specific market segment. Now that a finished production unit exists at Rolling Optics, new materials can be created for many different product types. Companies will have the possibility of integrating security features, while maintaining freedom of design in the communication of their brands.

“Security that is visible”

Product counterfeiting is an increasing global problem, especially when it comes to pharmaceuticals, electronic products and even luxury goods, such as designer clothes and perfumes. Fredrik Blomquist, CEO of Rolling Optics, points out that valuable brand names have enormous challenges ahead of them and that, in principle, the problem extends over all product categories.

“As an example, a detailed field-study on a malaria medication showed that 53% of the products in South East Asia were forged. The study found sixteen different counterfeit hologram labels that all had the characteristic metallic glimmer. The designer industry is also at risk and there are even examples from unexpected areas, such as the construction industry.”

It is quite evident that the need for new materials and methods to combat counterfeiting is enormous. According to Fredrik, visible security clearly stands out as being the most important. Shop personnel must be able to easily identify that a product is authentic and customers should feel safe when buying it.

“The advantage of our new materials is that anyone can see and recognise them: you don’t need a laboratory to identify the right package. This gives confidence to those companies that use them in their distribution channels, all the way to the consumer.”



See the 3D effects of the material on [www.rollingoptics.com/beyond](http://www.rollingoptics.com/beyond)

Prototypes of packages with the new material.

Visual effects provide greater opportunity for creativity

Although the main purpose was to create materials that are as secure and as safe as possible, it is evident that their visual effects can influence the entire appearance of a product. These materials give a unique 3D impression, which can be used to create new stunning and visually attractive effects. Integrating them into packaging and products is simple and offers great freedom of design for each brand.

"In this way, products can amplify their communication and lift the brand name in markets where it's becoming increasingly difficult for brands to stand out on the shelf and in the consumer's mind. Products must quite simply be seen. Only then do people remember and recognize them," continues Fredrik.

From concept to production in 3 years

The idea for the materials took shape when Axel Lundvall, CTO at Rolling Optics, was a research scientist at Uppsala University and, together with assistant Professor Fredrik Nikolajeff, among others, studied optical materials and light scattering in thin foils.

"The initial idea for this sophisticated material and technology is about five years old, but the real developments took off about two or three years ago," explains Axel.

Thanks to the collaborative project with STFI-Packforsk, it was possible to define market needs for this invention. STFI-Packforsk found potential uses in packaging, an area that Rolling Optics had no experience of. The project led to different possibilities for converting the material, which were tested by Bo Lindskog, who is responsible for Packaging Materials at STFI-Packforsk. Rolling Optics was even able to quickly meet industrial partners for testing their materials on a bigger production scale.

Axel points out, "For us it is not simply a question of developing materials with unique optical effects, we place

great value in being able to easily convert and apply them in large volumes. We've put a lot of energy into creating a robust, secure production facility, that takes into account the entire product, from the raw materials to the finished label."

Fredrik concludes, "The best thing has been the fantastic number of enquiries we've received via the STFI-Packforsk network."

In one application this new optical material was tested on board products from Iggesund Paperboard. Bengt Johansson, Nordic Sales Manager at Iggesund comments, "It's important for us to support all development projects that give printers and converters of board materials increased possibilities, so that their products will stand out from the rest." He sums up, "In this instance, we see the opportunity of solving security problems, while creating graphics effects as well." ●

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#### Teknikföretaget Rolling Optics

har i samarbete med STFI-Packforsk och dess nätverk av partners tagit fram en helt ny generation visuella material för etiketter och förpackningar. Projektet är ett bra exempel på hur STFI-Packforsk kan agera som en innovationspartner och bidra till ett företags tillväxt. De nya materialen kan användas för att ge ett unikt uttryck som är mycket svårt att kopiera och som dessutom lyfter varumärket och gör det synligt på hyllan.

– Fördelar med våra nya material är att vem som helst kan se och känna igen dem. Det behövs inga laboratorier för att identifiera rätt förpackning, säger Fredrik Blomquist, VD för Rolling Optics.

Det nya materialet har bl a provats på kartong från Iggesund Paperboard.

– För oss är det viktigt att stödja alla utvecklingsprojekt som ger tryckare och konverterare av kartongmaterial utökade möjligheter att få sina produkter att stå ut från mängden, säger Bengt Johansson, nordisk försäljningschef vid Iggesund.

## Profile



Marie-Claude Béland

By her fervent involvement in converting ideas into new products for the market and by getting the most out of various parties and networks, Marie-Claude Béland personifies the concept of STFI-Packforsk as being an innovation partner.

"We have extended our networks to include companies and research groups not traditionally associated with what we've done before. This opens up new possibilities for us and for our partners", says Marie-Claude.

"It's thrilling to link research results to the market, to stand with one foot in both camps, so to speak."

Marie-Claude's research work is characterized by its business considerations. This traces itself back to an MBA from McGill University in 1993. Her career took off at Paprican, a Canadian institute. She moved from Canada to Sweden and the Institute for Optical Research in 1995. As Department Manager for Surface Characterization, she contributed to building up the then newly started Acreo in 1999. In parallel with her work, she wrote her doctorate thesis in Physics/Optics and defended it at the Royal Institute of Technology in 2001. She has been the Manager of the Product Appearance & Usability Group at STFI-Packforsk since February, 2005.

"Leading this Group is among the best experiences I've had. Being able to combine the development of new materials and functionality with an understanding of how consumers react to them makes it possible for us to direct our research efforts towards our customers' needs. It's especially exciting to be able to participate in developing the next generation's environmentally friendly materials, functions and appearances."

In her leisure time, Marie-Claude enjoys a wide spectrum of activities that for some reason seem to come in pairs: from travelling and learning Italian to gourmet cooking and working out at the gym. ●

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# Collective resources meeting future needs

## STFI-Packforsk hosted a seminar on tissue

Like many other lines of business, the tissue industry is continuously facing new challenges in market development, manufacturing technology, raw material supply and energy consumption. A new generation of highly qualified expertise would be greatly welcomed by the tissue industry.

One initiative to take up this challenge was taken by STFI-Packforsk that organized a seminar called Future Research, Development and Education in the Tissue Business that was held on 10 February, 2009.

“In recent years, STFI-Packforsk has received many enquiries about what’s going on in the field of tissue production. With this seminar, we wanted to get a picture of what the needs are while, at the same time, present what we and the entire Swedish network can do in this field,” states Anders Pettersson, Senior Vice President of R&D at STFI-Packforsk.

### New prospects with EuroFEX

It is not a coincidence that this seminar was held at STFI-Packforsk and at such a time. At the moment, major rebuilding and extensions are being carried out at the EuroFEX Pilot Plant. This project goes under the name of KAW 2009. This title is derived from the Knut and Alice Wallenberg Foundation that provided SEK 25 million in financial support.



Holger Hollmark was deeply involved in the planning of the seminar and also acted as moderator at the final panel discussion.

The KAW 2009 will provide many new opportunities for the development of tissue production, among other things. One of the new things is fractionation equipment. Hannes Vomhoff, Manager of the Paper Technology Group, describes the plant as a new opportunity for utilising existing materials more efficiently and effectively in order to attain the properties being aimed at in a product.

He continues, “With the new fractionation facility, it will be possible, for example, to run the whole stock preparation section with one and the same raw material and then be able to divide it up into different flows later on. This means a much more efficient use of the raw materials, while it will be easier to control the properties in a particular product.”

The seminar also provided the opportunity of showing some of the resources at STFI-Packforsk that are important for tissue production. Among these is the possibility of producing thin paper on its Pilot Paper Machine with a transfer belt as well as printing with ink-jet on other pilot equipment, which is appealing for printing short series, such as serviettes. Apart from the Pilot units, STFI-Packforsk has got several laboratories for testing and analysis. One of the more special laboratories, which is relevant for the evaluation of tissue, is the Human Product Interaction (HPI) Laboratory, where the visual and tactile properties of a product are analysed from the perspective of users.

### R&D&E

The concept of R&D&E was introduced in the invitation to the seminar. This stands for Research & Development & Education. The aim of this was to become aware of the future needs for higher education and research. Holger Hollmark of IMPTEC, together with Professor Luciano Beghella of Karlstad University, gave a presentation of ATER (Arena for Tissue Education and Research). According to him, many advances have been made but there is still a lot left to develop and improve on. Holger is very optimistic about this way of gathering all the relevant parties involved and is hoping for the repetition of a similar seminar in a few years.



Results and research resources were presented on posters from technical institutes, universities and research institutes. Below: Luciano Beghella, Karlstad University.

He comments, “Experience tells me that there is always a great deal of interest in the field of tissue. There are a number of major conferences that function as very good places for meeting and marketing. However, with this seminar, we put a new focus on research, development and higher education.”

Following the seminar, STFI-Packforsk, together with the industry and other researchers, is now going to form a number of joint research tasks into multi-client projects. ●

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### Den 10 februari

arrangerade STFI-Packforsk seminariet Future Research, Development and Education in the Tissue Business. Syftet med seminariet var att få en bild av vilka behov som finns och samtidigt visa upp vad företaget och hela det svenska nätverket kan göra inom tissueområdet för att möta nya utmaningar gällande affärsutveckling, produktionsteknik samt råvaru- och energianvändning.

Vid seminariet presenterades några av STFI-Packforsks resurser som är betydelsefulla för tissueproduktion, bl a pilotpappersmaskinen EuroFEX och HPI-laboratoriet (Human Product Interaction), samt postrar från universitet och högskolor.

STFI-Packforsk kommer nu efter seminariet att tillsammans med industrin och övriga forskningsutförare forma ett antal gemensamma forskningsuppgifter till ett multi-client projekt.



The STFI-Packforsk Analysis and Testing Days are very important as a network for people working in laboratories of the Nordic pulp and paper industry.

## Popular forum for laboratory engineers

The STFI-Packforsk Analysis and Testing Days took place on 2 and 3 December, 2008. They were directed at laboratory personnel working with the physical testing of pulp and paper. There were many familiar faces among the participants. This is an event that many want to come back to again and again and, in certain cases, they apply even before invitations have gone out.

Anette Lindé has taken part and organized the Analysis and Testing Days since they began in 1984. She is still as enthusiastic as ever before each conference.

"This is one of the most enjoyable things to be involved in. There is an incredibly optimistic mood throughout the whole conference, including every-



Anette Lindé enjoys organizing the Analysis and Testing Days.

thing from the lectures to the mingling and the dining. Such a thing is infectious. This is the only forum for lab staff in the Nordic region. It's therefore regarded as a very important network. These days offer a lot of opportunities for establishing contacts."

Besides networking, the concept of the Analysis and Testing Days is to give the participants information about methods, standards and regulations. One field that received special attention at the December conference was optical standards.

Anette explains, "There's a lot to choose from, which can be difficult for people to take in. Staffan Rydefalk, of STFI-Packforsk, was able to clarify a lot as well as report on the ISO Meeting in Seoul. Among other things, he gave an account of new methods, such as colour measurement."

Also on the programme were methods for measuring mechanical properties, the straightness of fibres, paper twist and curl, variations in permeability, etc. However, there were some new things for the conference. Eva-Lena Hult Mori from PFI presented a paper on composite materials and Göran Flodberg from STFI-Packforsk talked about barriers in packaging. A film on Ösjöfors Mill was a very popular feature.

The Analysis and Testing Days are held once every three years. The next one in 2011 will be the tenth anniversary for the conference. ●

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### COMING EVENTS

#### MARCH

- 9-11 Packaging Diploma Course, I
- 11 Normpack Annual Meeting
- 19 PPT of Sweden: Spring Seminar
- 26 ChemSource On-line Conference

#### APRIL

- 21-22 5th Chemical Analysis Seminar
- 22 Paper Edge, session 4

#### MAY

- 4-7 Packaging Diploma Course, II
- 5-6 Final Seminar FRAM2
- 11-15 Worldstar Prize Award Ceremony
- 14 Miljöpack: Carbon Footprint Seminar

For further information on coming events, see [www.stfi-packforsk.se](http://www.stfi-packforsk.se)



### Chemical Analysis Seminar

**21-22 April, 2009  
STFI-Packforsk**

The Chemical Analysis Seminar (5<sup>th</sup> Pulp, Paper & Packaging Chemical Analysis Seminar) is a biannual Nordic forum for everybody interested in chemical analysis in the field of pulp, paper, packaging and biorefining.

Among the topics this year:

- Analysis of products from the biorefinery
- Product safety analysis and environmental analysis
- Process runnability and analysis

For registration and practical information, see [www.stfi-packforsk.se/chemicalanalysis](http://www.stfi-packforsk.se/chemicalanalysis)