

# IN BRIEF

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## 'SUNNY' CLOTHING

**The SunWear project aims to integrate flexible solar cells in textiles.**

The possibility of using solar cells on clothing, generating enough energy to run small electronic devices, has existed for some time. But these solar cells are stiff and not comfortable to wear. Another distinct disadvantage is the need to remove the solar cells before washing the garment. In the SunWear collaborative project TNO and the SINTEF Scandinavian research institute are aiming to overcome these disadvantages by using a new, flexible solar cell structure that is completely integrated in the textile.

The project is based on a combination of knowledge present at TNO and SINTEF concerning various parts of flexible solar cells. A sunlight-sensitive absorption layer and the Transparent Conductive Oxide (TCO) layer, as it is known, are deposited on an electrically conductive surface that is integrated in the textile. In addition, for comparison purposes, a commercially available flexible state-of-the-art solar cell is being applied to the textile. TNO will be testing the new and control solar cells integrated in their various ways to establish their resistance to deformation, humidity and temperature changes.

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## IN SEARCH OF A BETTER HOE

**In Ghana TNO is carrying out a development cooperation project intended to result in improved hand tools for the very poorest farmers.**

A traditional hand tool with which Ghanaian farmers carry out the majority of their work on the land is the hoe. But this tool isn't without its disadvantages: farmers complain of back pain and the hook is not easy to manipulate.

In cooperation with SIGN (a Dutch NGO), the local university, a local project leader and local farmers, TNO is now improving the design of this tool. This work is taking place within TNO's development cooperation programme.

The project's aim is to adapt the hoe ergonomically so that the local farmers can work their land more easily and efficiently, increasing productivity and reducing the physical strain involved. To this end, TNO is applying its knowledge of ergonomics, safe working and the

more efficient organisation of processes. The project is also looking at the scope for producing the improved tool locally; MBA students at the University of Amsterdam are compiling a business case to find out how production and use can be further expanded in Ghana. To date, the first prototypes in Ghana have been developed and tested in the field.

Local organisations and Dutch development organisations have responded positively to these new TNO activities. And at TNO similar feelings are held. 'We are enthusiastic about using our knowledge and expertise for people in developing countries,' reports Sander Zwanikken, the project leader. 'Both for our partners and ourselves, it is fascinating to learn how we can apply our knowledge and methodologies in a worthwhile way in a completely new context.'

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together anywhere, together anytime

## BETTER TREATMENT FOR NERVE GAS POISONING ON THE HORIZON

**The U.S. Department of Defense is sponsoring research by TNO and to-BBB into 'bioscavengers' for nerve agents.**

One of the major problems in treating people poisoned by nerve agents, such as sarin, is that the agent can easily reach the brain and cause brain damage, whereas many of the existing antidotes cannot cross the blood-brain barrier (BBB) in sufficient amounts. This leaves the brain inadequately protected. TNO in Rijswijk has been conducting research in this field for years, efforts that gained added import after the 1995 sarin gas attack by terrorists on a Tokyo subway. The treatment method now being researched with the support of the U.S. Department of Defense focuses on a particular protein: an enzyme called butyrylcholinesterase. The nerve agent prefers to bond with this protein, thereby becoming harmless; that is how

the protein derived its name as a 'bioscavenger'.

The trick, now, was to find a way of getting this protein across the BBB and into the brain, which is where the Leiden biotechnology company to-BBB came into play. to-BBB has developed a transport protein that recognises a certain receptor in the BBB, allowing it to traverse the barrier. By piggy-backing the butyrylcholinesterase on the to-BBB transport protein, researchers were able to get the bioscavenger through the BBB and into the brain. By combining the expertise of TNO and the U.S. Department of Defense in the fields of nerve agents and bioscavengers with the platform technology of to-BBB, we have hopefully found a way to produce better treatments for nerve gas poisoning. The research should be completed by the end of the year.

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## ECONOMIC GROWTH IN EUROPEAN REGIONS

**Which policies can boost economic growth in Europe's deprived regions?**

Europe has various regions whose economic development has yet to flourish. Sicily, the south of Spain and almost the whole of the Czech Republic are among the regions lagging behind the rest of Europe. These areas need additional investments in infrastructure, research and development, education and innovation to boost their economic growth. Cohesion policy of EU is one of the instruments, which can help them.

A model for five European countries is being constructed as part of the 'Systems of regional models for the assessment of European cohesion policy' project that runs until 2010. The project actors are TNO, the *Vrije* University Amsterdam and the University of Groningen, with the assistance of the Institute for Prospective Technological Studies in Seville. Project partners will develop a regional-economic model based on the methodology used for the construction of Spatial Computable General Equilibrium for the Netherlands (RAEM), developed by TNO ten years ago. Examples of the policies that can be analysed with the model are regional transport system improvements, public investments in R&D and education as well as the introduction of more energy efficient technologies.

The model is quite ambitious; it has the capacity to go beyond the present state-of-the-art models in this field. The model has the potential to become an important instrument for EU policy assessment in the coming years.

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## SOCIAL MEDIA OF THE FUTURE EXPLORED

**How can widespread families and friends use technology to enjoy collective activities?**

How can families and groups of friends living far apart share 'special' moments together and participate in the kinds of activities they enjoy when they are located in the same physical space? That is what TNO is exploring, together with thirteen industrial and academic partners from seven countries, as part of the TA2 (Together Anywhere, Together Anytime) project. This project has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement no. ICT-2007-214793. The other Dutch partners are Philips and the Centrum voor Wiskunde en Informatica (CWI, Centre for Mathematics and Computer Science).

In the project, the researchers explore applications that can help families maintain long-distance relationships. Contact by e-mail and telephone is individualised by nature. The challenge for the TA2 group, then, is to develop new applications tailored to group use, ones that are inviting and facilitate and encourage social interaction. To give an example: when family members play games together, it is not just about the game itself, but also about the congenial time spent together (complete with chatting, teasing and cheating). TA2 investigates how such social information can be translated into future group applications.

As part of their research, the project partners observed communication rituals among families living in Germany, Great Britain, the Netherlands and Sweden. The family members were interviewed about the methods they use to maintain relationships over long distances, their use of communication media, and their needs, desires and concerns. A general desire was that any form of technology must be easy to use. TA2 is now using the research findings to develop five 'demonstrators' for informal, everyday group communication. The applications being developed could obviously also be used more broadly for other forms of group communication. The project started last year and runs through January of 2012.

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## TNO REPORT FOR EUROPEAN PARLIAMENT

### Which new risks are emerging in the field of health and safety at work?

Under a framework contract with the Committee on Employment and Social Affairs of the European Parliament, TNO recently completed a study of emerging risks in the field of health and safety at work. It concerned the risks of nanotechnology, psychosocial stress, physical strain and situations in which combined risks arise. These risks are examined in the study's report, and suggestions are made for EU-level measures that could be taken to minimise them.

On 11 February TNO presented the research during a committee meeting in the European Parliament in Brussels. The report entitled, *New Forms of Physical and Psychosocial Health Risks at Work* is available to download via the website of the Parliamentary committee: [www.europarl.europa.eu/activities/committees/studies.do?language=EN](http://www.europarl.europa.eu/activities/committees/studies.do?language=EN).

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## NEW RESEARCH PARTNER FOR FLEXIBLE ELECTRONICS

### Plastic electronic GmbH, an Austrian SME, has joined the network of Holst Centre.

Based in Linz, plastic electronic GmbH is a producer of thin film hybrid electronics. Having been spun off from the Johannes Kepler University in 2005, the company recently joined the network of partners concerned with Holst Centre's systems-in-foil programme. Initially, this cooperation is intended to bring about the accurate interconnection and lamination of foils with various functionalities.

Expectations of systems-in-foil are high. Yet, while much progress has been made in the research, the effective commercialisation of actual products is still keenly awaited. Accordingly, efforts are now focusing on adapting the manufacturing processes to produce large volumes at low cost price. Plastic electronic is one of the few companies worldwide to have commercialised thin film hybrid electronic

products; that's what makes the company's participation in Holst Centre so interesting. For the programme's other participants the availability of plastic electronic's expertise offers the prospect of decreasing their own time to market. Conversely, Holst Centre gives the new Austrian partner easier access to supplementary expertise and to potential customers.

Holst Centre is an initiative by TNO and the Flemish IMEC. It is an open innovation centre in which a range of industrial and research partners are cooperating in a number of fields including systems-in-foil.

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## OCCUPATIONAL HEALTH AND SAFETY ADVICE IN AZERBAIJAN

### An international team of experts evaluated the occupational health and safety policies in Azerbaijan – and made recommendations for improving them.

Under a project financed by the World Bank, the Republic of Azerbaijan had an audit performed of its occupational health and safety and healthcare systems over the course of the past year. The government's ultimate goal is to institute legislation governing these fields. An international team of experts (led by TNO researcher Jan Michiel Meeuwsen) made recommendations on how to modernise the Azerbaijani State Labour Inspectorate and allow it to operate more effectively and how to improve the legislative and regulatory framework and standards under which it operates.

The experts recommended that safe working practices be firmly embedded in the culture at all work sites. This could be accomplished by

modifying the relevant legislation and regulations accordingly, introducing risk assessment within companies, and creating a health and safety commission to advise entities at every level (state, company and workplace). The government must set the prime example in terms of occupational health and safety, keep the topic on the nation's agenda, report on any results achieved and exchange information on their experiences with the International Labour Organisation and EU countries. Finally, the experts stressed that it is essential that sufficient financial resources be devoted to the matter and training be provided for the purpose of implementing good occupational health and safety policies.

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## UPSET RECOVERY TRAINING IN FLIGHT SIMULATORS

**TNO is starting a programme with eight partners to make flight simulators suitable for upset recovery training of commercial pilots.**

A relatively large number of fatal aircraft accidents are caused by poor upset recovery. In this case, the term 'upset' refers to the aircraft entering an unusual or extreme attitude, from which it can only be saved, and the normal flight path resumed, by the crew's prompt and proper response. Accordingly, there is a great need for upset recovery training. However, doing so in real aircraft is unsafe and expensive, and an adequate flight simulator training does not yet exist. The SUPRA (Simulation of UPset Recovery in Aviation) project under the EU's Seventh Framework Programme is designed to develop a suitable flight simulator training programme.

The project will be undertaking two important steps as part of that process. First, the simulator's mathematical aircraft model, which predicts the aeroplane's flight behaviour, will be extended. The problem is that existing aircraft models are based on wind tunnel and flight tests under normal conditions – not upset conditions. The second step will be to develop special motion software to create the most realistic motion possible in the flight simulator. An important factor in upset recovery is the g-load. In this respect, TNO is fortunate to have its Desdemona simulator facility in Soesterberg, which can generate g-loads of up to 3g.

SUPRA is being conducted by a consortium that includes – besides TNO as the project coordinator – the National Aerospace Laboratory (Netherlands), AMST Systemtechnik (Austria, manufacturer of Desdemona), the Max Planck Institutes (Germany), Boeing Research & Technology Europe (Spain), De Montfort University (UK), and three Russian partners with unique aerodynamics know-how. The consortium also includes experts representing various international organisations, including ICAO, IATA, KLM and Airbus. The resulting simulator scenarios will be evaluated in Desdemona by experienced test pilots from Airbus and Boeing.



Photo: Walter van Dijk

Desdemona simulator facility in Soesterberg.

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As an independent organisation, TNO turns knowledge into practical applications and so contributes to the innovative capacity of business, both at home and abroad, as well as social and international organisations.

TNO has a broad package of products and services, from advising on policy, products and services and performing contract research to the testing and evaluation of products and systems and certification according to international standards. In addition, TNO focuses on future knowledge issues through the TNO Co-financing programme, with co-financing through business that helps establish the direction of this knowledge development. Finally, TNO provides licences to some 700 inventions in its patents portfolio.

The expertise of nearly 4,300 employees has been brought under five core areas:

- TNO Quality of Life
- TNO Defence, Security and Safety
- TNO Science and Industry
- TNO Built Environment and Geosciences
- TNO Information and Communication Technology

The TNO Companies holding company brings innovations to the market via its specially founded subsidiary companies.

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