IN BRIEF

PROJECT FOR CHEAPER, FLEXIBLE SOLAR CELLS

A new European project is about to get under way on the development of efficient and cheap, flexible solar cells.

Thin-film photovoltaic solar cells use less material than the traditional silicon-based solar cells and their possibilities for large-scale, cost-efficient application are significant. The best results can be expected from CIGS (copper, indium, gallium, selenide) cells on a flexible substrate. However, a real breakthrough will only come once the solar cells can be produced 'on the roll'. The project, called hipoCIGS ('New concepts for high efficiency and low cost in-line manufactured flexible CIGS solar cells'), aims to make this possible by developing innovative flexible substrates and deposition processes.

TNO's role within hipoCIGS focuses on the development of a process for the deposition – at high speed and low temperature – of an electrode (TCO, transparent conductive oxide) layer on the 'front side' of the absorbing layer.

The other partners in the consortium are Corus, Pemco, the Warsaw University of Technology, Flisom AG, EMPA in Zurich, Würth Solar GmbH & Co and the Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg. The project has a three-year term.

Info: pieter_jan.bolt@tno.nl

Photo: Jomi Valo / Holland in Beeld

LEAP FORWARD FOR INTELLIGENT TRANSPORT SYSTEMS

Over the next two years a great leap forward will be taken in making the Netherlands the guide to Intelligent Transport Systems (ITS).

Cars are increasingly being equipped with systems that interactively communicate with other road users, select the most economical driving option and provide up-to-date information on road works, traffic jams, events and parking possibilities. Such high-tech applications make the existing car fleet more sustainable and help combat traffic jams at the same time.

A group of companies led by NXP, Logica, TomTom and TNO are joining forces with a number of universities and SMEs to investigate the best way of uniting the useful (ITS, navigation, cooperative cruise control, etc.) with the enjoyable (multimedia, consumer services, etc.) in a single, easy-to-use screen. This will give the car driver information about traffic jams, the weather and road works in a safe manner. The method will be designed such that new services can always be added, like expansion cards or downloading updates via wireless connections. The entire architecture (in the vehicle, the roadside and the back office) will have an open platform structure; other parties will be able to add services provided that they comply with certain quality criteria.

In addition to the development of smart systems for cars, the SPITS (Strategic Platform for Intelligent Traffic Systems) project will also be looking at new ways of modifying existing roadside systems like loops and portals to enable cooperative technologies and so allow, for instance, quicker response to accidents and, consequently, fewer delays.

The first demos and project results will be revealed at the Intertraffic trade fair in Amsterdam in March 2010.

The Dutch Ministry of Economic Affairs is supporting the project in the context of the High Tech Top Projects, intended to stimulate innovation and R&D in Dutch industry. The resulting products and services must also have application possibilities in other markets. The project runs until June 2011.

Info: nico.zornig@tno.nl

THERMOGAPHY MAKES GALVANIZATION SAFER

TNO will be advising the companies affiliated to the National Association of General Galvanizing (Stichting Doelmatig Verzinken) on the interpretation of thermographic readings to enhance the safety of the production process.

After the pre-treatment of a steel object that has to be galvanized, pre-treatment solution may be left in cavities in the object. If this comes into contact with the liquid zinc during the galvanisation process, life-threatening situations will occur: the expansion can be so rapid that the hot liquid zinc – and sometimes in vast quantities – can be ejected from the zinc bath. However, residual pre-treatment solution can be detected by a thermal camera that is able to read the difference in temperature that the location of the residual solution emits.

TNO will now be helping the companies affiliated to the National Association of General Galvanizing to interpret thermographic readings. Experimental thermal readings will serve to develop not only a structural metering method but also a learning process so that the process operators can set up the thermal camera optimally and track down the residual pre-treatment solution.

TNO is collaborating with the M2i Materials innovation institute and twelve galvanizing companies in this project that will be completed next year.

Info: piet.schwering@tno.nl

The commander of Task Force Uruzgan VI, brigadier-general Tom Middendorp, and his civilian representative Joep Wijnands in talks with the governor of Uruzgan, Assadullah Hamdam.

Photo: Ministerie van Defensie

SUPPORT FOR PEACE MISSION STAFF

A tool will advise commanders on the non-military aspects of a mission.

Military missions in other parts of the world seldom concern exclusively the performing of military tasks. Reconstruction is often key. So military commanders and their staff require more than just military strategic insight but also knowledge of how to translate the mission objectives into specific behavioural changes among the local populations or warring parties. Aspects may include the reduction of opium production, encouraging girls to take advantage of educational opportunities or combating corruption among the police and other government services.

In the context of the *Human Social Cultural Behavioral Modeling (HSCB)* research programme of the American Defence ministry, TNO is developing, for that ministry, a wikipedia-like *tool* that commanders and their staff can use to incorporate relevant economic, social-psychological, cultural or legal aspects into their planning, decision-making and evaluation in a better, more structured way. The project will be completed at the end of 2010.

Info: tony.vanvliet@tno.nl, guido.tebrake@tno.nl

QUITER AND CLEANER GARBAGE TRUCK

A quieter garbage truck can be used in towns in the evenings and at night.

Garbage collection has to comply with peak standards in order to operate in urban centres like Amsterdam where the maximum peak levels are 65 dB(A) between 19.00 and 23.00, and 60 dB (A) between 23.00 and 7.00. Being able to collect garbage in the evening and at night makes for a more flexible operation and less traffic hindrance. However, conventional trucks do not comply with the noise standards, so TNO, Gemco and Geesink-Norba are currently developing a hybrid garbage truck for ICOVA, the garbage processing company, for use in the centre of Amsterdam. This is being done in close collaboration with the municipal authorities of Amsterdam, DAF Trucks N.V. and DAF Truck dealer Truckland Noord-Holland.

Apart from less noise, the new garbage truck will have to produce lower emissions. Therefore, the vehicle will be equipped with a diesel-hybrid drive and, wherever possible, be electrically powered. While the purchase price of such a vehicle is likely to exceed that of a conventional vehicle, the life expectancy is longer and the fuel and maintenance costs will be considerably lower. The maximum speed is 85 km per hour.

A route has already been established during an actual drive through the centre of Amsterdam and TNO had already ascertained for SenterNovem the procedure to determine noise the peaks during loading and unloading.

At the moment the hardware and suppliers need are being selected so that a final design can be established. The new garbage truck is expected to attract interest from countries like Italy where legislation is tough on noise standards.

Info: olaf.opdencamp@tno.nl

IN BRIEF

TNO EQUIPMENT ABOARD THE PROBA-2 SATELLITE

On 2 November the *PRoject for OnBoard Autonomy – 2* (PROBA-2) satellite containing a digital sun sensor and cool gas generators began orbiting the Earth.

The *Digital Sun Sensor*, developed by TNO and SODERN (France) and the *Cool Gas Generators*, developed by TNO and Space SME Bradford Engineering, can now be demonstrated in space and gain some 'practical experience'. The latter is vital for future commercialisation and expansion of these two technologies.

Sun sensors inform satellites about their orientation in respect of the sun, data that is crucial for navigation and control, and thus to the success of each mission. TNO has more than 35 years' experience in making sun sensors and the DSS on board PROBA is the more accurate one of a range of products from coarse to fine accuracy. The in-orbit performance experience of this digital sun sensor will also be used in the development of even smaller sophisticated digital sun sensors *on chip*.

The four cool gas generators mounted on board Proba 2 are a new and cost-efficient system for the storage and generation of gas in space. The simple and robust generators have clear benefits compared to current gas generation systems: they are not pressurised before use, can be kept for a long period, produce nitrogen at room temperature and do not leak. Generating pure gas like nitrogen and oxygen at room temperature is essential for current manned missions such as the ISS international space station and for future sealed life systems increasingly used in both general and commercial space flight. The technology can also be used for propulsion and inflatable structures. The unique properties of cool gas generators can also be used for terrestrial applications, like lifeboats, helicopter emergency floatation systems and fire extinguishers. This Proba 2 Cool Gas generators are developed by TNO and Bradford Engineering. Aerospace Propulsion Products BV is a key partner for the commercialisation for terrestrial applications.

Info: jos.demooij@tno.nl

MORE EFFECTIVE SURVEILLANCE BY PEOPLE SEARCH ENGINE

The 'people search engine' enables people to be efficiently tracked and monitored over camera images whose fields of view do not overlap.

Camera surveillance and person tracing are central to a safe society. The huge amount of surveillance cameras –each generating a mass of images – makes the operator's job of finding and monitoring certain people difficult and time-consuming. A human observer can ascertain what is happening in a single image but a computer can analyse a large quantity of simple events. Operator support using an automatic system in the form a people search engine could offer a solution that compensates for a human weakness: dealing with large numbers.

Last year the University of Amsterdam, Observision and TNO developed an automatic search system as part of the MultimediaN project enabling people to be retrieved more quickly from a large quantity of images. The results revealed that the (retrospective) detection of a person from a large database can be considerably accelerated by the search engine. A system has also been developed to monitor people realtime in an area whereby the cameras do not overlap; this has been tested in a controlled environment. This system enables questions to be answered more quickly, such as 'Where did this person come from?' and 'Where is he going?'. Next year the partners hope to develop and test the algorithms further in a more realistic environment.

Info: henri.bouma@tno.nl

EARTO INNOVATION PRIZE 2009 FOR TNO

On 9 December in Brussels TNO received the EARTO Innovation Prize 2009 for developing the legionella chip.

TNO received the prize due to the impact that the legionella chip has had. In the lab the legionella chip makes it possible to establish within four hours whether a water sample contains *Legionella* and, if so, whether this is a pathogenic variant. This makes it much faster and more accurate than the traditional culture method that can take up to a week. The chip means that the administrators of hospitals, institutions, swimming baths, hotels and cooling towers can get better analyses much faster. Since the legionella chip provides much more accurate information about the actual public health hazard, the associated costs can be considerably reduced.

The jury of the EARTO Innovation Prize 2009 mentioned not only the major social and economic relevance of the chip but also pointed to the clear business strategy in getting this innovative product to market.

The legionella chip was developed by TNO in collaboration with Vitens NV and will be manufactured and marketed by Legyon, a subsidiary of Vitens and TNO.

EARTO is an organisation of more than 350 *Research and Technology Organisation* affiliates, with around 150,000 staff, from around Europe (and beyond).

Info: roy.montijn@tno.nl, frank.schuren@tno.nl, rik.thijssen@vitens.nl

EFFECTIVE USE OF BIOCIDES IN BUILDING MATERIALS

TNO will be coordinating the European Axioma project aimed at developing smart biocide release systems for use in finishing materials for building and construction.

In construction and finishing materials organisms like algae en mould often present problems. Mould can affect the durability of materials, and can produce an unhealthy atmosphere in buildings and algae on surfaces can lower the aesthetic value of building materials – these are just a few examples.

To prevent this, construction materials are supplemented with bioactive substances that are blended into the matrix material and will release from the material over a period of time whether bio-organisms are present or not; the release mechanism is therefore both passive and uncontrolled. Once all the biocides have been released, the materials should be replaced to ensure protection against the growth of organisms. This means an unnecessary use of biocides and material, which is undesirable in view of the environmental harm and exposure to chemicals.

The Axioma project ('Active eXternally Induced release in cOnstruction MAterials'), will be carried out within the EU's Seventh Framework Programme, focuses on the development of smart release systems for the biocides used in construction. If the substances are be released only when necessary (that is, when organisms start to grow), their use can be drastically reduced. TNO, as coordinator, has plenty of expertise in relevant fields like encapsulation, formulation, controlled release and combining release systems in construction materials. This expertise is being used in the project which involves fourteen partners (knowledge institutes, SMEs and multinationals) from six different countries.

Info: bart.erich@tno.nl

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

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Coordination
TNO Corporate Communications Department
P.O. Box 6050
2600 JA Delft
The Netherlands
phone +31 15 269 49 90
fax +31 15 262 73 35
e-mail redactie@tno.nl

Editors
Jan van den Brink
Renée Heijligers

Text production
CPLS text & copy, Goirle

Art direction
Onnink Grafische Communicatie b.v., Oudenbosch

Lithography and printing
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T +31 15 269 69 69
F +31 15 261 24 03
E infodesk@tno.nl
www.tno.nl/wegwijzer

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